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ABSTRACT

In a study of cognitive therapy as a strategy for compensatory education, fourteen low-achieving first graders in the Holly Springs Separate School District (Mississippi) were assigned to treatment conditions consisting of a teacher trained in cognitive therapy, an aide, and a small class size. The therapy relied upon a clinical tutorial model involving identification of cognitive skill deficiencies and tutoring to eliminate the deficiencies in stepwise, hierarchical order. For grade two, the subjects were assigned to a teacher who was untrained in cognitive therapy, and the trained aide from the first year. In the third year, the experimental subjects were assigned to a regular classroom with a larger class size, while the control group during the first two years was exposed to the experimental conditions of cognitive therapy and a small class size. Achievement testing at the end of the study indicated that experimental subjects showed greater gains than controls after first grade, and continued to outperform the control group during second grade, even with minimum cognitive therapy input. Achievement differences in the third year (when experimental and control groups were switched) were not readily observable. The research demonstrated the importance of teacher training in using cognitive therapy as a compensatory education approach. (MJL)

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# ACCELERATED ACADEMIC PROGRAM FOR LOW ACHIEVERS

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A Program Designed to Raise Aptitude and Achievement of Low-Achieving Elementary Students

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UD 022 856

A project of the Holly Springs Municipal Separate School District.
Funded by ESEA, Title IV-C and the Mississippi State Department of Education, Title IV-C Division.

AUGUST, 1977 - MAY, 1980

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## FOREWORD

The Holly Springs, Mississippi Municipal Separate School District administration and board has been and is concerned about the concrete effect of compensatory education programs designed to help academically low functioning students of the district. With the assistance of a continuing three year grant from Title IV-C ESEA and the assistance of the Mississippi State Department of Education's Title IV-C office, the Holly Springs School District attempted to develop and implement a program designed to raise aptitude, academic achievement and the affective areas so vital to success.
We hope the study will be beneficial to the reader and provide a desirable alternative in the continuing effort to better educate students.

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## PREFACE

As project director for the Accelerated Academic Program for Low Achievers, a project designed to raise aptitude and achievement through cognitive instruction, my excitement over the program's educational potential is undiminished. It would be appropriate for the reader to remember that this program was a pilot study; consequently, decisions implemented as a best alternative may now be subject to questions. Hopefully, those decisions will help the potential adopter avoid similar problems.

During the three year study some weaknesses became evident. Many points of program strength also emerged. A synopsis of the cognitive program follows:

**Study Strengths**

1. The program was effective in raising both aptitude and achievement.

2. Affectively, student attitude was more positive. The experimental group exhibited above average self-confidence and poise. Students thought they were capable of achieving and did.

3. The program objectives were directed toward development of critical thinking skills and problem-solving in a language base. The cognitive curriculum can be implemented at minimal cost using existing and teacher-made materials.

**Study Weaknesses**

1. An in-house supervisor knowledgeable in cognitive methodology was needed to oversee the day-to-day functions of the project, to ensure success and to work with teachers in guidance as needed.

2. Project teachers showed varying degrees of interest and scholarship in preparing for and teaching the methodology of cognitive therapy.

3. A quasi-experimental design is difficult to implement in an institutional setting. The study does indicate, however, that a basal teacher with a desire to include cognitive strategies in their ongoing teacher-learner experiences, can be successful.

In reviewing this three-year study of cognitive therapy retrospectively, several recommendations to be considered that are not specifically stated in the body of the text emerge:

1. Each teacher using this approach should be thoroughly schooled in the theory and practical application of cognitive therapy in the classroom.
   (Apparently, few people are trained in this area.)

2. The adapting teacher must be intelligent, receptive to change, and highly motivated with a degree of self-scholarship. The best teacher for this program is the teacher who has a desire to learn for him/herself and to implement the skills to be mastered in delivering a cognitive approach to teaching.

3. Results of this study indicate better student gains in the early grades. Kindergarten and/or first grade is recommended for program implementation.

4. Supplies and materials for the cognitive therapy program need not be expensive. Existing basal and supplemental as well as teacher-made strategies and materials are sufficient.

5. Teachers can integrate the cognitive therapy method as an approach to teaching their existing subject matter.

## INTRODUCTION

The origins of cognitive therapy can be traced to the force winds of social change so prominent in the 1960s. The words **desegregation** and **poverty**, words that have become thematic to describe the 1960s, were, in meaning and intention, the terms that stimulated rhetoric, interest, and money for poverty populations, notably black Americans from backgrounds of isolation, deprivation, and disadvantage. This same decade spawned a new awareness of the plight of many black Americans, a momentum for cohesive identification of ethnocentric values among blacks, and an urgency to resolve this plight and facilitate this identification.

Yet, despite well-intended efforts, several significant barriers have presisted to impede whatever level of progress in the dream of the leaders of that time. This introduction does not analyze why some black Americans experience chronic poverty in a nation characterized by affluence, or why other black Americans experience frustration from social resistance in their drive toward the ideals of opportunity. Any such analysis might result in what several black authors have already admitted; "While the black's role has changed, it has continually been one of inferiority (Taylor, 1974)." At the same time, any such analysis would necessarily include the larger single set of discriminating behaviors among blacks, notably language. Because language is the most overt reflection of cultural values, coupled with the fact that many black Americans do not enjoy mainstream cultural values as do other Americans, the matter of black language must be studied carefully as one contributor to the persisting problems and unrealized dreams of many black Americans. On this point, there has been substantial effort to delineate and define the language of black Americans as a system of habits having many shared but many unique characteristics by comparison to the model language of white Americans. Further, there is a fair amount of research to indicate that speakers of standard American, white and black alike, hold negative views toward those who speak non-standard language habits. This negative view is known to transcend differences of skin color.

The point is that speakers having certain linguistic habits are labeled as inferior. Unfortunately, many black Americans possess these linguistic habits. For purposes of clarification, language is defined here as an aggregation of conventionalized verbal symbols and rules used by a community of speakers to represent the ideas shared among the community. From this rather simple definition, one must become aware that verbal symbols are arbitrary and can be conveniently developed within the community to serve whatever purpose speakers intend through their use. Language is a code system that is inseparable from and dependent on both socio-cultural and psychological (cognitive) controls. Such controls refer to needs of an individual and the community to share commonness, declare individuality, and exchange both through the medium of listening and speaking or reading and writing. The origins of black American language (BAL) have been treated extensively by Dilard (1922) and, by sheer weight of historical documentation, are, with apology, ignored here. By way of interpretation, however, BAL can be attributed to variables of (a) African influences of long or short standing historically, (b) unique phonetic and structural rules of uncertain origin, (c) geographical influences, (d) educational background, and (e) features of isolation as a speech community. One need only contrast the mastery of Standard American speech by many black Americans with the distinct non-standard speech of black Americans in the South Carolina and Georgia coastal regions known as the Gullahs to appreciate that black American language may be perfectly consistent with or widely disparate from the structural features of Standard English (of which Standard American is a close parallel). Also, one needs only to contrast the language habits of the prestigious versus the poverty-ridden black American to come to a conclusion, as Fanon (1964) has, that as one commands mastery of standard American he grows "whiter" in "direct ratio to his mastery...." Further, Fanon believes that speakers of black American's language harbor negative feelings about their language which, in turn, contributes to negative feeling generally about self and community. One cannot ignore the realities of oppression of the black minority and degredation of all things black, occurring over several centuries in North America, coming to a head and presenting a primary cause of the social unrest of the 1960s. Certainly, the foment of change reached every sector of American life, social,

political, economic, and educational. It would be difficult to turn away from education in that sector that drew the most heat during the 1960s, since it was Brown vs Board of Education that struck down separate but equal and brought the impact of desegregation to virtually every school system in the nation.

Suddenly, it seemed, the culture of poverty, isolation, and different language habits became matters of immediate concern. Questions were posed and answers were sought. The presence of poverty black children, amidst and among white children, focused interest on why black children failed to perform successfully in school. The questions were several:

A. Are there such differences between black American language and standard American language to account for the educational failure of poor black children, especially in their acquisition of reading, spelling, and writing?

B. Is it that educational tests assess a socio-cultural mainstream and thus bias, by language and socio-cultural differences, the successful performance of black children?

C. Do educational materials appeal to model American experiences and thus fail to appeal to children from backgrounds of poverty and disadvantage?

D. Are educational methods appropriate for children reared in poverty homes having substantial departure from American mainstream attitudes, values, and beliefs?

Perhaps these questions deserve an affirmative response and, collectively, for the explanation for the educational failure of a substantial and shockingly concerning number of America's black children.

**ORIGINS OF COGNITIVE THERAPY**

It is against this background of social and educational change, sponsored by Federal funds in a War on Poverty, that many educators advanced educational programs to ameliorate the instructional and measurement bias thought to have been a root cause for failure of poverty black children. It is a courtesy to many of these educators to suggest that their programs were well-intentioned despite the fact that nearly all early educational intervention programs were developed by quasi-experts, "do-gooders" without expertise in linguistics, psycholinguistics, or sociolinguistics, offering ready made solutions from the prejudicial base of the traditional curricular programs in "black packaging." These were marketed without any rationally or empirically derived justification for their existence while other such curricular programs, based on serious sociolinguistic considerations, were largely disregarded (Feigenbaum, 1971). Most of these "black packaging" programs have disappeared, some have persisted--only one has prevailed. This notable program, for reasons to be discussed, is DISTAR marketed by Science Research Associates.

The best explanation for the failures and successes of educational programs can be made from the assumptions underlying their development. Becker and Engelmann (unpublished manuscripts) have presented these assumptions succinctly in the sense that schools have their modal appeal, in curriculum, for white, middle-class children who speak Standard American. This modal appeal has ignored the need to systematically teach the socio-culturally different child the imperatives for successful school function, namely, **words and their referents.** Among children from the socio-cultural mode, schools and their curriculum can work successfully from the premise that basic oral language skills (understanding, comprehension, and expression) have been taught by parents in pre-school years. To the point of the problem of among disadvantaged children, Bereiter and Engelmann (1966) have written:

"The disadvantaged child..usually does have a language, even though an immature and

nonstandard one...In such characteristics as sentence length, word variety, and the use of various grammatical categories and constructions, the language of disadvantaged children resembles that of other children at a lower age level... The speech of the severely deprived seems to consist not of distinct words, as does the speech of middle-class children of the same age, but rather of whole phrases and sentences that function like giant words...The second weakness...is a failure to master the use of structures and inflections which are necessary for the expression and manipulation of logical relationships."

The thesis above is that modal oral language skills are not available to the disadvantaged child during language development in the pre-school years because such are not possessed by his parents and transmitted from parent to child. If the school's programs fail to systematically build oral language among disadvantaged children, beginning at the skills level of the child and not the skills level assumed by the socio-cultural mode, where will the child be able to gain the missing skills and how will he gain the foundation for advancing oral language skills within the school's curriculum? The answer is one of historical reality: He will not gain oral language skills, will fail, and will become part of the recycling of disadvantage and poverty.

## THE RELATIONSHIP OF COGNITION AND LANGUAGE

Although language was defined earlier, it is redefined simply here as one's stock of meanings and one's rules for organizing communication of those meanings. A stock of meanings, is, in many ways, the equivalent of vocabulary, and vocabulary can be a useful tool so long as one recognizes that words are arbitrary, often refer to many mental acts, and that words serve as organizers for intelligent behavior. Words are the organizers of a universe of information, and when mutally organized intelligibly and cohesively by grammatical rules or intuitions, serve as the primary method for transferring information. Communication is this transfer of information. Because some words can derive their meaning only in relationship to other words, one must treat **word** more expansively to include phrase structures, i.e., **is** bears little meaning in isolation but weighs heavily in **is happy.** These "little words," called function words, are akin to glue that hold other words in meaningful relationship.

Cognition refers to a mental act, a term roughly equivalent to concept. Cognition is not the concept, instead cognition is the manner, a logical process, by which the concept is caused to occur. An example will be instructive. No doubt pre-school children see and hear a host of things used to "take you places." In this "take you places" concept, the child may well hold a mental notion of a car, airplane, bus, and train because he has seen each in his life space, i.e., perceived directly on streets, in the air, or via television. He may very well know that each is, indeed, "to take you places," and he very well may be able to name each when each is re-experienced. Suppose, though, that we direct him, "Tell me the names of some common vehicle!" Should the child not have the term **vehicles** in his stock of meanings, cognition will not occur despite the fact that it can demonstrate he possesses the concept by restating the directive as, "Tell me things that can take you from place to place!" In actuality, however, the disadvantaged child may not have the concept and instead know **airplane** as "the thing up there," or **car** as "daddy has one," or **bus** "takes you to school."

From this example, cognition can be seen as the operation between the task-directive, the concept and the task-response. By way of a scheme, cognition can be shown to be operative in the performance of

nearly all tasks, especially so in school related tasks. In an arithmetic problem, such as 2 + 4 = □, cognition pervades the arithmetic operation as follows:

| | 2 | + | 4 | = | □ |
|---|---|---|---|---|---|
| Cognize: | a number-- | an operation | --a number-- | an operation | --an answer |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Conceptualize: | a quantity | -- | to be added to | -- | another quantity | -- | equal to | -- | another number |

Without cognition, the conceptual phase cannot function. It is needless to say, now, that language is fundamental to these operations (cognition) and understandings (concepts) since the arithmetic terms (2, 4, plus, equals) and mathematical relationships are aural-oral, heard and spoken, then written and read.

The speech of the poverty black child can also impede the cognitive base for operating on this simple first grade arithmetic problem. Among such children, it is common to hear function words, such as **and, it, is,** and **in,** as a vowel only, an utterance roughly equivalent to /**uh**/ or /**ih**/. A statement **it is in the box** is heard **ih ih ih da bask.** Substituting /**ih**/ for the function words in the 2 + 4 = **6** problem, read as 2 and 4 is six, the black child may speak 2 uh 4 ih six, 2 ih 4 uh six, 2 ih 4 ih 6, 2 uh 4 uh 6. These might come to mean a number of "unmathematic" problems such as 2 is 4 is 6; 2 or 4 is 6; 2 is 4 or 6; 2 or 4 or 6; or 2 or 4 and six. The omission of the discrimination consonant sounds in **and, it, is, or** and **in** ignores an important cognitive cue for dealing with an otherwise undemanding arithmetic equation.

## COGNITIVE SKILLS OF LOWER-CLASS BLACK CHILDREN

One of the earlier studies of the cognitive skills of lower-class black children was that of Sigel and Olmsted (1970), a study undertaken in the mid-1960s with Head Start children. Their study was confined to classification tasks, tasks in which children were required to group objects on the basis of their "belonging" or "going together." Two conditions were studied, a passive and an active classification. In the passive condition, the children were required to select objects belonging together on the basis of some logical relationship. In this condition, the children were not required to relate why they grouped the objects together. In the active condition, the children were required to verbalize whatever relationship they could discover among related objects grouped by an examiner.

By comparing the performace of their subjects on the passive and active conditions, the investigators hoped to gain an understanding of the "cognitive style" of Head Start children. Further, their study sought to discover the long-range effects of classification training, especially at two age levels (5 and 6 year olds).

When a child is presented with objects (common objects or pictorial representations such as pencil, paper, cup, blocks, matches, pipe, crayons, ball, etc.) and asked to group objects or pictures that belong together, as in the passive condition, a number of events are possible. A child could, for example, group two items, ingore the rest, where the two items have no practical relationship yet do look alike (a cup and a spinning top) because they both are the same approximate color. Should a child group in this manner, simply because the items so grouped have physical properties in common, i.e., color, shape, texture, etc., it can be interpreted that he did so on perceptual grounds. On the other hand, he might group objects on more practical grounds, such as putting a pencil, crayons, and paper together, perhaps to indicate that he "knows" the functional relationship of pencil and crayons with paper. By contrasting these examples, a perceptual response can occur when cognition is based on same peripheral attribute; a functional response can occur when cognition is based on some experimental or intuitive reasoning of common functions. In a passive task, where the child groups but

his basis for grouping is unknown (because he wasn't required to speak), the child's "cognitive style" can only be inferred.

When the child is required to report, by speaking, as in the active condition, his cognitive style becomes apparent. Putting a pipe and matches together and reporting "They're for smoking" tells clearly that the child understands the relationship of these objects.

Sigel and Olmsted were able to offer a number of interesting observations concerning cognitive skills of their subjects. First, objects seemed to yield better classification performance than pictures suggesting that black children use perceptual cues from the dimensionality of objects. Next, the passive condition yielded higher grouping scores than the active condition suggesting that such children can classify but that they are sometimes without the verbal skills to relate the basis of their groupings. Finally, the passive condition, for combined objects and pictures, yielded better performance than the active condition for combined objects and pictures, suggesting that it was easier for their subjects to classify on their own intuitions rather than explain the relationship of items in a pre-formed grouping.

From this study it is somewhat apparent that lower class black children use intuitive perceptual cues as cognitive facilitators in classification tasks. Although this study did not attempt to compare black children to more advantaged black or white children, the study did attempt to answer the question of whether training could improve the performance of the children under study. Their study concluded favorably on this question since it was found that short term training in classification tasks does persist. By way of generalizing this study to school achievement, classification tasks pervade the elementary curriculum in the sense that children are required to learn and/or discover "things that belong together" or, cognitively speaking, to ascertain **equivalence** in reading (homonyms, synonums, word look-alikes, phonic identities) writing (graphic similarities, colors, sizes, shapes) and arithmetic (mathematical equalities). A child who depends on multi-dimensional cues to cognize information will be virtually lost in first and later grades since school is a two-dimensional environment. Further, a child who functions passively (has intuitive but not verbal and reportable bases for cognitive development) will be impotent in handling routine tasks imposed in the school's environment, one where answers are expected and reasoning is rewarded.

## THE STRUCTURE OF INTELLECT [SOI] MODEL AND COGNITIVE FUNCTIONS

In 1956, the eminent psychologist, J. P. Guilford, advanced a theory of intellectual function by positing a structural model having 120 different and discreet cells of function. Guilford's model (1956) was a dramatically different approach to the analysis of intelligent behavior inasmuch as earlier models, most reviewed by Anastasi (1954) or Chronback (1960), were comprised of a much smaller number of factors such as "g" (general intelligence) plus a few other intelligent behaviors, i.e., verbal reasoning, perceptual speed, etc. The advantage of Guilford's model has been that the 120 factors underlying intelligence or associated with intelligent behavior has provided considerable expanse for the analysis of intelligence and intellectual function, educational planning based on the discovery of strong and/or weak intellectual factors possessed by individuals or groups, and modification of curricular content to accomodate selected intellectual abilities or disabilities. The early work of Guilford has been passed on to and refined by Meeker and her associates, who, within the SOI Institute, have "attempted to interpret a complex model of intelligence... (and) to show that cognitive therapy can be accomplished within the domain of the school, for it is in the schools that learning and social problems are most often detected (Meeker, 1969, p. 184)." On the basis of this model, cognition is viewed as hierarchical. The lowest level of cognition is cognition of units. A unit is defined as "relatively...circumscribed items of information having 'thing' character (Meeker, 1969, p. 196)." On the other extreme, is cognition of implications, defined as "Extrapolations of information...predictions

known or suspected antecedents, concomitants, or consequences (Meeker, 1969, p. 196)." Between units and transformations, in ascending order of cognitive function, are classes, relations, systems and transformations. In addition, cognition is viewed as occurring for four types of content, figural (information in concrete form), symbolic (information in the form of denotative signs), semantic (information in the conotative signs), and behavioral (information in the interpretive sense such as moods, intentions, etc.).
The combination of cognition with figural contents in the aformentioned hierarchical order appears as follows:

Cognition of Figural Units
Cognition of Figural Classes
Cognition of Figural Relations
Cognition of Figural Systems
Cognition of Figural Transformations
Cognition of Figural Implications

There are six more factors for each of the other contents also, i.e., cognition of symbolic units, cognition of behavioral implications, etc. In all, the cognitive domain from the SOI model has 24 different "cells" of abilities. This model is, as mentioned hierarchical, but it is also taxonomical. The figural system is lower, taxonomically speaking, than behavioral, with symbolic and semantic ordered in between, respectively. From this hierarchical and taxonomical ordering, the lowest cell of ability is Cognition of Figural Units and the highest cell of ability is Cognition of Behavioral Implications. Through research efforts, directly by personnel associated with the SOI Institute[1] or by others using the SOI model, various procedures have been devised to analyze a subject's performance with respect to cognitive factors as outlined above or others within the 120 cell model. Such analysis is usually rather clerical, involving tallying a subject's responses item-by-item and entering these in a prepared matrix for interpretation. Although a time consuming process, it is a process that can be undertaken with very little special training. The SOI model, although theoretically complex, is practically simple. Meeker's text (1969) details these procedures adequately.

## COGNITIVE FACTORS AND COGNITIVE THERAPY

The simplicity of the hierarchy of cognitive factors in educational practices becomes apparent if one thinks in the scheme of task analysis, that scheme where each learning task is broken down into each and all underlying abilities with the abilities then reordered from the least to most difficult. The example to follow presents such an analysis in the application of a cognitive hierarchy to reading recognition using Cognition for Symbolic Contents:

1 SOI Institute
214 Main Street
El Segundo, California 90245

**Cognition for Symbolic Units**

The ability to identify, name, and/or sound isolated letters

i c r d
u o
e v n

**Cognition for Symbolic Classes**

The ability to group letters into classes

| Consonants | Vowels |
|---|---|
| c r | i e |
| v d | u |
| n | o |

**Cognition for Symbolic Relations**

The ability to group letters into word relationships

| | |
|---|---|
| un | cover |
| ed | ing |
| er | |

**Cognition for Symbolic Systems**

The ability to change root words and affixes

cover
uncover
covered
covered
covering
covering

**Cognition for Symbolic Transformation**

The ability to manipulate root words by principles of affixation

uncovered
uncovering
recover

**Cognition for Symbolic Implications**

The ability to discover new affixes to further manipulate root words

re-recovered
unrecovered
unrecovering

The above analysis could be undertaken for arithmetic equally, and other cognitive factors, i.e., semantic, figural, can also be specified hierarchically for vocabulary, spelling, writing, social studies, and, of course, comprehension without regard to subject related comprehension.

The SOI Institute has produced several manuals for use by teachers for the purpose of specifying various classroom or tutorial activities consistent with the needs of learners. Such manuals are useful guides to supplementary learning activities when it has been discovered that one or more pupils have deficits in one or several cognitive factors. It may be emphasized here that the entire scheme of this

type of compensatory education is clinical. As a clinical prodedure, this compensatory educational scheme is based on a test-teach-retest procedure. The test-retest segment of the procedure is a matter of choice, based largely on selection of one or more measurement instruments that can isolate cognitive deficiencies. One measure, to which the cognitive analysis procedure has been applied more than others, is the Wechsler Intelligence Scale for Children, either the orginal or revised editions (WISC-R). Following the administration of the test, factors are studied and deficits are located. On the basis of the deficits, a hierarchical management plan is developed attending to deficits in the most basic of cognitive functions at first, removing these, then attending to and removing the rest-in hierarchical order. At some later time, a re-test, using the same instrument as the pre-test, reveals the relative success of the management program. To assist the individual responsible for developing the cognitive therapy program, the SOI Institute, based on research in cognitive and intellectual growth, produces age referenced factor norms.

It is from these norms that the educational diagnostician can determine when deficits exist, in which factors the deficits occur , interrelationships among deficits, and the hierarchical order for management of the deficits. Again, by reference to these norms, the diagnostician can readily determine the outcomes of the managment design, modify the design as needed, or conclude that the design was effective when children achieve at levels consistent with expectation as defined by the norms.

## COGNITIVE THERAPY VERSUS CURRICULUM

From the above exposition, it can be understood that this scheme of compensatory education is not curricular. Curricular programs, whether they exist as basal programs or in the form as supplemental programs such as DISTAR®discussed earlier, are based on assumptions. For normal children, the assumptions are those coexisting with the term **normal**, meaning that children will learn from the sequence of mastery objectives given that each is **normal**. Distar makes such assumptions, except this program does not follow from a diagnostic base other than it was designed as a compensatory program for otherwise "'assumedly" non-normal children. Cognitive therapy functions without assumptions and replaces assumptions with evidence of specific or group needs with management isolated to these defined needs. As such, cognitive therapy is a clinical/tutorial model of compensatory education--not at all a curriculum.

## ORIGINS OF THIS STUDY

The Holly Springs Municipal Separate School District is located in the environs of the community of Holly Springs and Marshall County in North-central Mississippi. This area is principally rural. The citizens of this area are dominantly black, poor, and educationally disadvantaged. The vast majority of pupils entering the district's school can be described as disadvantaged. Children entering the grade one program of the schools, in the main, have experienced Headstart enrollment; yet, despite such preschool experiences, many pupils present complications of health, nutrition, intellect, speech, language, socialization, and motivation upon formal school entrance. These complications are those occurring from and because of the convergent aspects of poverty which operate negatively on traditional educational programs.

The history of pupil progress in the district's elementary school has been one of under-achievement at all levels. The beginnings of under-achievement can be traced to lack of pupil success in first grade; with under-achievement compounding grade-by-grade due to the failure of first grade children to gain

necessary scholastic skills at the earliest time. This systematic failure in turn creates secondary motivational problems (for pupils and teachers alike) because "catching up" is difficult if not impossible. The history of under-achievement has been somewhat continuous over the years despite utilization of many new educational concepts and programs designed to intervene under-achievement among disadvantaged groups. From the complications apparent in the Holly Springs District among entering grade one pupils, the proper location for compensatory education would place programs in first grade and through the early elementary curriculum.

Clearly, the focus of compensatory education must be at the earliest point when the child comes under the sponsorship of the schools. An effective program of compensatory education in the early grades would intervene under-achievement at all later grades.

**PURPOSE**

The purpose of this project was to study experimentally the outcome of two variables designed to provide a compensatory educational program for entering first grade children in the Holly Springs Public Schools. The first variable was that of teacher/pupil ratio, and the second variable was the performance of children on measures of intellectual function and school achievement as an outcome of the incorporation of cognitive therapy supplementing the regular curriculum.

The first variable, teacher/pupil ratio, was selected for this study for several reasons. First and foremost was because of the knowledge that language and language-related cognitive processes are developed typically between parent and child during the preschool years. When such processes are insufficient for mastery of school content at the time the child enters school, it seemed unreasonable to expect that a large teacher/pupil ratio would suitably augment deficient or delayed language and cognitive processes to normal levels. Certainly, the experience of the Holly Springs Public Schools indicated that teacher/pupil ratios of twenty-five or thirty pupils per teacher, as had been the case for many years, did not have a facilitating effect on language and cognitive development of disadvantaged children evidenced mainly by the serious levels of academic under-achievement pervasive within the school district. A reduction of the teacher/pupil ratio was felt to be in order to provide the necessary level of language and cognitive interaction between teacher and pupils to more closely approximate the parent to child interactions known to facilitate such development. The second variable, test performance (intellectual function and school achievement), was selected simply to provide bases for data used routinely to assess pupil progress. Since achievement in school has been shown repeatedly to be a high correlate of intellectual ability, and since the purpose of cognitive therapy is to expand a pupil's capacity to think rationally and express ideas effectively, it was reasoned that cognitive therapy would change a child's intellectual and achievement status concurrently.

This project was conducted over a three year period in order to follow a group of experimental subjects from their beginning of first grade through their completion of third grade. A year-by-year analysis of their progress was judged to be necessary since school content accelerates from pre-academic readiness at the outset of grade one through mastery of most basic academic skills by the end of grade three. A final analysis at the end of the three year period was judged to allow for study of relationships of the project's variables across these critical years of a subject's development of basic academic abilities.

This three year project studied also a group of control subjects against whom comparisions of the performance of experimental subjects could be made, year-by-year and for the total project period. As in the case of control subjects, experimental treatments, i.e., cognitive therapy and reduced teacher/pupil ratio were denied. At this point, it is important to note that the design of this study was one where control subjects became experimental subjects in the third project year, that is, the identity of subjects groups as experimental or control was changed in the third project year. Simply, control

subjects became experimental subjects, receiving cognitive therapy in a low teacher/pupil ratio, and experimental subjects became control subjects, not receiving cognitive therapy in a low teacher/pupil ratio, these changes occurring the third project year.

The change of subject's groups as explained above was undertaken to assess the effects of cognitive therapy administered in a grade later than grade one, i.e., to the controls when they arrived at grade three not having had cognitive therapy in the earlier two grades. Further, this change allowed the assessment of retention of the effects of cognitive therapy among experimental subjects as these subjects became controls in the final project's year.

The procedures to follow provide details of the experimental design of this project. Because of the necessity to report details of curriculum of cognitive therapy and the substance of implementing cognitive therapy, many materials will be reported in appendices rather than in the text of procedures.

## PROCEDURES

This brief introduction to the project's procedures was prepared to acquaint the reviewer with the project's duration and general plan of activity. Following this introduction, this section shall detail aspects of subject selection, the testing program, and the treatment method (cognitive therapy).

The project began in the Fall of the 1977-78 school year and terminated in the Spring of the 1979-80 school year. Over this three year period, subjects of this project, experimental and control, grew in age six to nine years and advanced from first through the third grade. In this period , subjects were tested on the **Wechsler Intelligence Scale for Children-Revised** on four occasions: (1) At the time when they were beginning first grade as part of subject selection procedures, (2) At the end of first grade, (3) At the end of second grade, and (4) At the end of third grade. On these four occasions, subjects also were administered measures of school achievement, a group test as part of the school's general testing program, and an individual test (**Peabody Individual Achievement Test**) administered at or about the time the WISC-R was administered.

Cognitive therapy was administered to subjects identified as experimental. Those subjects were located in a contained classroom having as its single discriminating characteristic a pupil teacher ratio of one teacher, and an aide, per the thirteen experimental subjects. Subjects identified as controls were located in a regularly graded classroom intermixed with pupils not participating in this project.

### SUBJECTS

At the outset of the 1977-78 school year, all entering first grade children were administered the **Primary Mental Abilities Test** (PMAT) as a screening instrument to assist in selection of subjects for this study. From the results of this screening test, pupils having a PMAT IQ in the range of eighty to eighty-nine were considered candidates for the project so long as their supporting school documentation indicated their membership in a low socio-economic class. This latter distinction was based on the pupil's eligibility for free school lunch, such eligibility occurring because of poverty-level family income relative to family size.

One by one, candidates were administered the WISC-R by one of several qualified examiners until such a time as a sufficient number of candidates had been qualified as subjects for the project.

In all, twenty-eight subjects were needed for the project, fourteen subjects for an experimental classroom and another fourteen for a control group. The number fourteen for an experimental classroom was selected to represent one-half the number typically found in any given grade one classroom in the school district. Such a number as fourteen was judged to be sufficiently small to constitute a relatively "low" pupil to teacher ratio. The number of fourteen for a control group was arbitrary, selected mainly for an equal number consideration for later statistical analysis of the project's outcomes. In all, more than forty-nine pupils were administered the WISC-R before the

twenty-eight needed subjects were found to be matched in groups of fourteen each. One group was identified **control** and the other **experimental** on the outcome of a coin toss. Table 1 presents the results of the matching procedure by describing both the control and experimental groups on equating variables, i.e., sex, age, IQ, and achievement. Not any of the observed differences shown in Table 1 were statistically significant, thus groups were considered "matched" at the point of the project's beginning.

In the first project year, these groups were held intact with respect to numbers. In the second project year, the control group lost one subject and in the third project year the experimental group lost one subject. As a consequence of this attrition, only the second project year experienced unequal numbers with the first and last project years having fourteen and thirteen subjects per group, respectively.

TABLE 1

Description of Control and Experimental Subjects on Equating Variables

| VARIABLES | SUBJECTS | |
|---|---|---|
| | CONTROLS* | EXPERIMENTALS |
| SEX | | |
| Male | 7 | 6 |
| Female | 7 | 8 |
| DECIMAL AGE | 6.31 | 6.38 |
| INTELLIGENCE (WISC-R) | | |
| Verbal Scale IQ | 83.79 | 83.78 |
| Information | 8.57 | 8.57 |
| Similarities | 5.93 | 7.50 |
| Arithmetic | 8.00 | 8.21 |
| Vocabulary | 7.79 | 8.36 |
| Comprehension | 7.00 | 7.79 |
| Performance Scale IQ | 86.07 | 82.36 |
| Picture Completion | 9.43 | 9.93 |
| Picture Arrangement | 6.14 | 5.07 |
| Block Design | 7.86 | 6.71 |
| Object Assembly | 8.36 | 7.71 |
| Coding | 8.29 | 7.64 |
| ACHIEVEMENT (PIAT) | | |
| Total Test | 86.29 | 91.79 |

All decimal values are means of the obtained data. Observed differences are not significant.

* The project began with fourteen subjects per group, but one subject in each group was lost over the project's duration.

## TREATMENT GROUPS

Subjects were subsequently assigned to treatment groups. Controls were assigned to first grade classrooms where they received the extant curriculum of the school with such curriculum modified only with respect to instructional variables reflecting the style of teachers. Experimentals were assigned to a classroom for the experimental treatment (cognitive therapy).

In the first year, the treatment conditions consisted of: (1) A grade one teacher in her first year of employment but one who had been pre-trained and maintained by in-service in the theory and application of cognitive therapy; (2) An aide who worked directly with experimental subjects under the supervision of the classroom teacher; (3) A class size numbering only the total of experimental subjects, fourteen; and (4) A fund of information regarding the pre-test intellectual and cognitive status of subjects in the experimental condition for the purpose of the teacher's guidance of the curriculum generally and the supplemental work of the aide specifically toward the development of the cognitive, intellectual, and achievement status of experimental subjects.

In the second project year, treatment conditions for experimental subjects were modified in the following ways: (1) Experimental subjects were assigned to a second grade classroom and instructed by an experienced teacher who was provided an orientation to cognitive therapy for the purpose of her role in the project year, and (2) an aide, retained from the first project year, to continue cognitive therapy on a daily small group basis as directed by the project's consultant.

The difference in treatments for experimental subjects from the first to the second project year dealt mainly with the sophistication of the classroom teacher with respect to cognitive therapy. In the first year, the classroom teacher instructed subjects from a focus on cognitive therapy and supplemented regular instruction by guiding the aide in daily group work with subjects. In the second year, the classroom teacher was incidental, conducting regular grade two instruction without a focus on cognitive therapy, but with the aide presenting cognitive therapy on a regular small group basis as directed by the project's consultant. In the third and final year of the project, experimental subjects became control subjects and were assigned to third grade classes where cognitive therapy was absent and teacher/pupil ratios were typically one to twenty-six or one to thirty. Conversely, control subjects became experimental subjects and were administered cognitive therapy in a low teacher/pupil ratio, the class size being the number of subjects (thirteen). The treatment conditions for these now experimentals repeated that of the second year, namely cognitive therapy delivered daily in small groups by the aide with the classroom teacher responsible primarily for routine third grade instruction. The difference between the second and third project year treatments was that mainly of switching groups identity. The similarity was that cognitive therapy was delivered principally by the teacher aide with the classroom teacher charged mainly with the conduct of regularly graded instruction.

## TREATMENTS [COGNITIVE THERAPY]

Classroom teachers in charge of experimental subjects in the first two project years, and the classroom teacher in charge of the controls turned experimental subjects in the third project year, were provided with in-service training relating to the purpose and procedures for conducting cognitive therapy, whether or not their role was in the actual conduct of delivering cognitive therapy. The one teacher aide (who was with the project throughout its duration) was included in all aspects of in-service training. As described earlier, the classroom teacher managing experimental subjects while these subjects were in first grade received not only in-service but continuing guided instruction by the project's consultant. This teacher, in turn, guided the activities of the aide. In the second project year, the classroom teacher's role was minimized with respect to cognitive therapy, with supplemental cognitive therapy managed principally by the aide who had had one prior year of experience earned within the first project year. The third project year was conducted as the second, with the aide

delivering the cognitive therapy program and the teacher dealing with the day-to-day instructional program of the third grade.

The major responsibility of classroom teachers in the second and third project years was to cooperate in making certain that subjects were grouped and in attendance for cognitive therapy sessions and that such sessions were conducted in fact for appropriate periods of time. In the first project year, as mentioned earlier, cognitive therapy was a primary focus of the activities of the teacher and the aide. Experimental subjects were instructed in basic academic abilities and were seen also in groups of three or four by the aide for periods of thirty minutes daily. In later project years, the aide saw the experimental subjects daily for thirty minute sessions, also in small groups. The membership of any particular group varied depending on how the classroom teacher had grouped subjects for other aspects of the ongoing curriculum.

The base of time-constant for cognitive therapy instruction was thirty minutes per child per day. This time-constant was essentially prescribed and was conducted without untoward variation across the project's years. In all, ninety hours per year of direct instruction in the aims of cognitive therapy was the single internal variable of this project's treatments.

## COGNITIVE FACTORS

Following the initial administration of the WISC-R used to qualify candidates as subjects for this study, and again at each post-test period thereafter (at the end of grades one, two, and three), the response forms of the WISC-R were evaluated for each subject by reference to cognitive factors contributing to a subject's intellectual status. Determining the cognitive factors of each subject and planning curriculum, compensatory curriculum as cognitive therapy as per this study, is the single purpose of assessing a subject's intellectual status by reference to those factors contributing to the subject's intellectual status. The mechanics of determining cognitive factors are clearly outlined by Meeker (1969) and materials to assist in this tedious process are available through the SOI Institute.[1] Because this study dealt only with cognition as one of many factors underlying intelligence, only cognitive factors were analyzed using the Meeker procedure. For example, a subject would be awarded one point of raw score in the cognitive factor **cognitive for semantic units** by virtue of a correct response to the WISC-R item (Information Subtest), "What do we call a baby cow?" Such a correct response on this and other items (without regard to WISC-R subtest) was summed and a total cognitive factor score for **semantic units** was obtained.

The adequacy of the obtained score can be assessed by reference to published expectancies for this and other cognitive factors. For example, by the end of grade one, any given subject, to achieve the distinction of **normal**, should have achieved a cognitive factor score in the factor **cognition of semantic units** of eight. This score of eight indicates that there are eight WISC-R items that tap cognition of semantic units appropriate for children at or about the age of seven (end of grade one). Also, this score of eight implicates the child's abilities or disabilities to name objects, actions, and/or events consistently with children of comparable age.

Diagnostically, a child who fails to achieve a score of eight on the **cognition of semantic units** factor can be considered as one who has not kept pace with his peers in the important ability to name objects, actions, and/or events. Another term for **semantic unit** is **vocabulary**, and such a factor deficit in cognition of semantic units would correlatively indicate a vocabulary deficiency. The presence of a deficiency becomes, from a diagnostic approach, the basis from which compensatory curriculum can be developed.

The cognitive factors of focus in this study number nine as presented in Table 2. In this table, the factors are listed hierarchically, that is, units are lower in cognitive order than transformations. The factor CFU is, in hierarchical interpretation, fundamental to CFR; and this relationship occurs between cognitive factors throughout, i.e., CMS is basic to CMT.

1. SOI Institute
   214 Main Street
   El Segundo, California 90245

Table 2. Cognitive Factors; Abbreviations and Definitions.

| FACTOR | COGNITIVE FACTOR | DEFINITION |
|---|---|---|
| CFU | FIGURAL UNITS | Ability to identify objects by name |
| CFR | FIGURAL RELATIONS | Ability to discover relations in materials perceived |
| CFS | FIGURAL SYSTEMS | Ability to perceive and orient spatial patterns |
| CFT | FIGURAL TRANSFORMATIONS | Ability to manipulate and transform objects into another visual pattern |
| CFI | FIGURAL IMPLICATIONS | Ability to visualize and select the most effective course of action |
| CMU | SEMANTIC UNITS | Ability to name objects, actions, and events (vocabulary) |
| CMR | SEMANTIC RELATIONS | Ability to state relationships among words |
| CMS | SEMANTIC SYSTEMS | Ability to comprehend and structure problems in preparation for solving them |
| CMT | SEMANTIC TRANSFORMATIONS | Ability to use several meanings for a word or expression |

## PLANNING COGNITIVE THERAPY

In order to prepare classroom teachers and the aide to implement cognitive therapy for experimental subjects, the following order of pre-service, in-service, and independent study was undertaken:

1. A general introduction to the scope of the Structure of Intellect (SOI) model made available through various publications of the principal authors, notably Meeker (1969), Hess and Gryde (reproduced in entirety in Appendix A), and Meeker (reproduced in entirety in Appendix B). These materials, in text format and as appended to this report, are sufficiently comprehensive to expose the entire underlying theoretical and applied background of intellectual function as the consequence of a subject's orderly development of factors contributing to such intellectual function.
2. A specific introduction to cognitive therapy made available through materials prepared by this project's consultant and presented orally and in-print. Appendix C illustrates a pre-service program of questions and answers followed by a self-study quiz, so designed to prepare teachers and their aide to focus on the aims, techniques, and outcomes of cognitive therapy.
3. Guides for curricular planning, appearing in the format of teacher's manuals and pupil workbooks, available through the SOI Institute, were made available to teachers. In addition, other planning materials, such as **SOI Questioning Techniques for Teachers** (referred to in the pre-service program, Appendix C), were made available for daily use by teachers and the aide. Appendix D presents a detailed listing of all relevant materials for reference, in-service training, and pupil instruction. Pricing information is included for the convenience of readers interested in purchasing these materials.
4. Instructional outlines for directed teaching of cognitive factors **semantic units, relations, systems,** and **transformations** (expressive vocabulary and concept formation) were prepared by the project's consultant to guide the teacher aide in the routine of her daily group work with experimental subjects. These outlines are presented in Appendix E and F. Each of these outlines includes instructional techniques, a tracking method for assessing pupil change, and instructional content, i.e., word lists and conceptual categories. The contents of these outlines were demonstrated by the project's consultant to the teacher aide and she was observed in her implementation of the instructional content using the techniques recommended.
5. Supporting instructional materials were selected to augment those materials noted in two above; these materials selected cooperatively by the project's consultant and the classroom teacher and aide, or independently selected by the teacher and aide and approved by the consultant. These materials were selected largely on the basis of augmenting cognitive growth because of their specialized design. All such materials were commercially available from one or more specialty publishing firms. The criterion for selection of such materials was that each item recommended for purchase and use was such to stimulate a subject's mastery of content according to defined cognitive deficits. A subject, or a group of subjects, showing a deficit in **cognition of figural units** (CFU, the ability to identify objects by name), would be provided with supporting instructional materials to increase the capacity to recognize and name various objects (stimuli having "thing" value such as numerals, letters, sounds, etc.). Materials were selected to achieve this instructional goal and each was assigned a cognitive factor identity, i.e., CMU (refer to Table Two for a review of cognitive factors and their abbreviations).

   A detailed listing of supporting instructional materials is shown in Appendix G. Shown also is the cognitive factor assigned to each item of material and the supplier from whom these materials may be purchased. Pricing information is not included.

   In the main, presentation of supplementary materials to experimental subjects was conducted by the teacher aide according to directions contained within each item, i.e., as printed on a boxtop or an enclosed description. Some supplementary materials were acquired to support other aspects of instruction such as the use of pictorial stimuli in **Peabody Language Development Kit[s]** for

instructional outlines found in appendices E and F. In this instance, the curricular guides located in these kits were not used.

6. Lesson planning for small group work, conducted by the teacher aide, was prepared on a form presented in Appendix H. This form provided space for recording a planned activity, the source of the activity (teacher made or supplied by a commercial firm), and a space for notation of the cognitive factor. This latter notation was entered by transferring the cognitive factor identity as assigned by the project's consultant located on the commercial material to the lesson plan. The date(s) of the instructional activity were entered also.
7. Periodically, the project's consultant prepared documents to further direct the cognitive therapy instructional sequence. Appendix I presents a sample of periodic planning which was used at the outset of the experimental subject's third grade year, prepared to direct emphasis to cognitive/semantic factors which were found to be characteristic deficits among the subjects. More often than not, such directives were presented orally to the teacher aide at times of site visits by the consultant. At these site visits, it was the intention of the consultant to direct instruction, discuss problems as these occurred, i.e., selection of supplementary materials, grouping of subjects for instruction, etc., and to assist the classroom teacher and aide in the selection of other instructional resources or instructional techniques.

## RESULTS

Three sets of comparative data were available from measurement obtained from experimental and control subjects, namely IQs derived from the WISC-R, cognitive factors derived from those procedures described earlier, and results of achievement testing. These data were gathered at the outset of the study (a pre-test in the Fall of 1977 when all subjects were beginning first grade) and at the end of each grade (post-tests in the Spring of the years 1978, 1979, and 1980).

Table Three presents the mean performance of experimental and control subjects on measures used in this study. An inspection of this table indicates clearly that subject's groups were equated at the outset (pre-test) inasmuch as only small and insignificant differences can be observed between groups with respect to WISC-R Verbal and Performance or Full Scale IQs, cognitive factors (scores), or school achievement status. By contrast, the observed differences in these measures at the end of the first post-test period, Spring 1978, when subjects had completed first grade, show that experimental subjects greatly outdistanced their control counterparts in all areas of measurement. It can be observed also that control subjects showed, by comparison, little intellectual growth, some measurable cognitive growth, and some positive change in measured achievement over this period. These observed differences are such to conclude that cognitive therapy produced rather impressive gains among experimental subjects and that regular classroom instruction provided control subjects produced little in the way of gains after a full year of formal schooling.

The observed differences between subjects over the second grade year, the comparison of scores from criterion measures from post-tests in 1978 and 1979, shows that the experimental group had little relative change in intellectual growth, cognitive growth, or achievement; whereas control subjects showed a tendency toward improved performance over this period; growth occurring without known bases but occurring at a measured rate one year slower than their experimental counterparts. Simply, experimental subjects persisted in their first year gains through the second year with a minimum of cognitive therapeutic input to their school programs and retained their early start toward normalized achievement by comparison to their control counterparts.

In the third project year, differences between groups are not readily observable except in school achievement where nine scaled score points distinguish the better achieving experimental group. It was in this year where groups were switched, i.e., experimentals became the group without cognitive therapy and controls received a cognitive therapy program virtually indistinguishable from that given to experimentals in the second project year.

Table four presents the analysis of variance for criterion variables, such an analysis based on all values found in Table Three. Since this analysis fails to present comparative findings in favor of differences of one or the other group of subjects, Table Five was prepared to provide a post-hoc analysis of the obtained data.

From Table Five, the t' values of subjects in the pre-test condition demonstrates that all observed differences were insignificant. The t' values for comparison of experimental and control subjects at the 1978 post-test period (end of first grade) were statistically significant with the exception of the WISC-R Performance Scale means despite the observation that this difference was in favor of experimental subjects.

Further inspection of Table Five indicates that all statistically significant differences occurred over the pre to post-test period in the project's first year. This fact acquits the experimental conditions occurring over the first year. The absence of statistically significant differences (although observed differences overwhelmingly favor experimental subjects) indicts the experimental conditions in the second and the third year project. A review of treatment groups will assist the reader in the interpretation of these differences (see page 20).

Table Six presents summary data per subject underlying the analysis of variance and post-hoc tests reported above. Because the focus of this study was on group performance and not on individual

Table 3. Mean Performance of Experimental and Control Subjects on WISC-R, Cognitive Factors, and School Achievement over the Project Period.

| Project Period | Subjects | Verbal Scale | | Performance Scale | | Full Scale | | Cognitive Factors | | Achievement | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Pre-test, Fall, 1977 | Control | 84.21 | 5.62 | 86.07 | 4.20 | 83.79 | 2.96 | 82.07 | 7.66 | 84.00 | 3.29 |
| | Experimental | 87.38 | 3.67 | 82.08 | 5.91 | 83.38 | 3.36 | 83.23 | 6.66 | 84.23 | 3.20 |
| Post-test, Spring, 1978 | Control | 84.15 | 10.88 | 91.07 | 8.04 | 86.31 | 7.20 | 89.07 | 12.30 | 93.00 | 9.23 |
| | Experimental | 98.23 | 5.47 | 98.00 | 10.02 | 97.69 | 6.76 | 102.00 | 5.00 | 106.69 | 6.42 |
| Post-test, Spring, 1979 | Control | 93.54 | 8.57 | 98.31 | 7.40 | 95.15 | 7.33 | 95.6 | 11.00 | 94.77 | 9.05 |
| | Experimental | 99.38 | 8.18 | 101.54 | 13.90 | 100.00 | 9.03 | 103.0 | 6.33 | 100.23 | 8.28 |
| Post-test, Spring, 1980 | Control | 91.54 | 4.89 | 101.23 | 12.62 | 95.69 | 6.47 | 98.53 | 6.00 | 86.38 | 12.52 |
| | Experimental | 97.08 | 8.35 | 99.92 | 3.67 | 97.92 | 9.05 | 99.07 | 9.00 | 93.31 | 13.28 |

*Control subjects received the experimental treatment in the third project year.

performance, Table Six is included here only to provide an inspection of individual performance. In this display, the most striking set of numbers are the achievement and WISC-R Full Scale IQs. Cognitive factors are a reflection, perhaps the cause, of IQ gains. The fact that the achievement scores for experimental scores for experimental subjects grew to the normal range in the first project year and remained so throughout the study, with some rapid learner values in the display, i.e., 121; and the fact that the IQ distribution (save one subject, E11M) shows substantial gains often as great as fifteen IQ points or more, attests to the effects of experimental conditions in the first project year. An interested reader might wish to use Table Six for additional analyses of individual change under treatment conditions of this project.

Table 4. Analysis of Variance for Control and Experimental Subjects, Criterion Variables, over the Project Period.

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | F |
|---|---|---|---|---|
| Observed differences between control and experimental subjects | 15,327 | 7 | 2189.57 | 9.00* |
| Observed differences between criterion variables | 611 | 4 | 152.75 | .62 |
| Interaction of observed differences of subjects and criterion variables over project duration | 18,348 | 19 | 965.68 | 3.97* |
| Within | 118,901 | 489 | 243.15 | |
| Total | 153,187 | 519 | | |

* Significant beyond the .05 level.

Table 5. Post-hoc Analysis (Scheffe' Method) of Mean Performance of Experimental and Control Subjects on Criterion Variables over the Project Period.

| Project Period | Criterion Variables | Experimental Mean | Control Mean | Mean Difference | |
|---|---|---|---|---|---|
| Pre-test, Fall, 1977 | Verbal Scale IQ | 87.38 | 84.21 | 3.17 | .51 |
| | Performance Scale IQ | 82.08 | 86.07 | -3.99 | .65 |
| | Full Scale IQ | 83.38 | 83.79 | - .41 | .07 |
| | Cognitive Factors | 83.23 | 82.07 | 1.16 | .19 |
| | Achievement | 84.23 | 84.00 | .23 | .04 |
| Post-test, Spring, 1978 | Verbal Scale IQ | 98.23 | 84.15 | 14.08 | 2.30* |
| | Performance Scale IQ | 98.00 | 91.07 | 6.93 | 1.13 |
| | Full Scale IQ | 97.69 | 86.31 | 11.38 | 1.85* |
| | Cognitive Factors | 102.00 | 89.07 | 12.93 | 2.11* |
| | Achievement | 106.69 | 93.00 | 13.69 | 2.24* |
| Post-test, Spring, 1979 | Verbal Scale IQ | 99.38 | 93.54 | 5.84 | .92 |
| | Performance Scale IQ | 101.54 | 98.31 | 3.23 | .52 |
| | Full Scale IQ | 100.00 | 95.15 | 4.85 | .79 |
| | Cognitive Factors | 103.00 | 95.60 | 7.40 | 1.20 |
| | Achievement | 100.23 | 94.77 | 5.46 | .89 |
| Post-test, Spring, 1980 | Verbal Scale IQ | 97.08 | 91.54 | 5.54 | .90 |
| | Performance Scale IQ | 99.92 | 101.23 | -1.31 | .21 |
| | Full Scale IQ | 97.92 | 95.69 | 2.23 | .36 |
| | Cognitive Factors | 99.07 | 98.53 | .54 | .08 |
| | Achievement | 93.31 | 86.38 | 6.93 | 1.13 |

* Significant beyond the .05 level; Sd = 6.12 with t' = 1.60, p.@.05.

Table 6. Performance of Subjects on Criterion Variables over the Project Period.

| Subject Identification Code | Cognitive Factors | | | | Achievement | | | | WISC-R Full Scale IQ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1977 | 1978 | 1979 | 1980 | 1977 | 1978 | 1979 | 1980* | 1977 | 1978 | 1979 | 1980 |
| C1F | 30 | 54 | 42 | 65 | 83 | 97 | 84 | 88 | 85 | 89 | 81 | 88 |
| C2M | 33 | 53 | 84 | 83 | 82 | 114 | 107 | 65 | 83 | 88 | 99 | 105 |
| C3M | 29 | 54 | 61 | 61 | 84 | 91 | 89 | 88 | 82 | 90 | 96 | 93 |
| C4M | 41 | 33 | 60 | 67 | 85 | 94 | 92 | 79 | 85 | 80 | 95 | 103 |
| C5F | 41 | 53 | 54 | 65 | 85 | 100 | 92 | 65 | 90 | 94 | 84 | 87 |
| C6M | 18 | 46 | 68 | 70 | 85 | 94 | 98 | 97 | 81 | 84 | 105 | 94 |
| C7M | 23 | 46 | 62 | 69 | 87 | 94 | 95 | 90 | 84 | 93 | 105 | 101 |
| C8F | 28 | 64 | 67 | 67 | 88 | 94 | 103 | 100 | 87 | 91 | 97 | 101 |
| C9F | 28 | 45 | 73 | 60 | 84 | 107 | 96 | 96 | 81 | 85 | 97 | 101 |
| C10F | 20 | 18 | 60 | 61 | 90 | 87 | 80 | 74 | 78 | 73 | 90 | 85 |
| C11M | 30 | 34 | 62 | 72 | 78 | 116 | 105 | 96 | 88 | 87 | 104 | 96 |
| C12F | 26 | 64 | 71 | 66 | 80 | 107 | 107 | 102 | 84 | 96 | 98 | 98 |
| C13M | 22 | 25 | 50 | 67 | 81 | 91 | 84 | 83 | 85 | 72 | 86 | 92 |
| E1F | 40 | 61 | 75 | 73 | 81 | 112 | 92 | 115 | 81 | 96 | 93 | 100 |
| E2F | 15 | 58 | 63 | 54 | 84 | 104 | 87 | 86 | 80 | 81 | 87 | 81 |
| E3M | 20 | 51 | 66 | 42 | 85 | 104 | 100 | 89 | 84 | 89 | 93 | 87 |
| E4F | 31 | 58 | 67 | 46 | 85 | 104 | 101 | 89 | 90 | 97 | 98 | 94 |
| E5F | 27 | 58 | 67 | 68 | 88 | 107 | 96 | 87 | 85 | 91 | 92 | 91 |
| E6M | 37 | 71 | 75 | 77 | 89 | 101 | 105 | 96 | 85 | 107 | 106 | 102 |
| E7M | 31 | 69 | 78 | 73 | 84 | 110 | 100 | 86 | 81 | 105 | 102 | 100 |
| E8M | 25 | 59 | 66 | 73 | 84 | 94 | 101 | 90 | 81 | 100 | 89 | 96 |
| E9F | 26 | 64 | 72 | 70 | 83 | 107 | 101 | 92 | 84 | 105 | 103 | 103 |
| E10F | 32 | 64 | 87 | 83 | 81 | 112 | 109 | 99 | 84 | 101 | 120 | 113 |
| E11M | 29 | 66 | 76 | 69 | 81 | 104 | 87 | 65 | 78 | 101 | 99 | 93 |
| E12F | 41 | 57 | 76 | 80 | 80 | 107 | 110 | 116 | 88 | 101 | 114 | 112 |
| E13M | 24 | 66 | 67 | 74 | 90 | 121 | 114 | 103 | 83 | 96 | 104 | 101 |

Summary Statistics for these data are found in Table 1. The Cognitive Factors displayed above were transformed prior to their display in Table 1.
* Control subjects received treatment in the final project year.

## DISCUSSION
## TITLE IV C ACADEMIC ACHIEVEMENT PROJECT

Over the three years of this project's duration, a group of thirteen disadvantaged children were administered a program of cognitive therapy in various doses. At their first grade level, they were administered cognitive therapy within their classroom routine by a trained teacher with a small group supplemental activity by an aide directed by that teacher. Further, their class size was small, numbering only the thirteen of their sample size.

From the advantage of these conditions, trained teacher, supervised aide, small class size, and cognitive therapy, the measured effects were significant and dramatic gains for these experimental subjects in intellectual function, cognitive growth, and school achievement. But of these conditions, questions must be asked and answered to assess which condition or conditions were responsible for these gains.

In order to make this assessment, a logic matrix was formed. This matrix follows using a question-answer format for each of these conditions:

| Project Year | Experimental Condition | Outcome |
|---|---|---|
| 1 | Trained Teacher + class size + guided aide | Significant Differences |
| 2 | _____ + class size + guided aide | Positive but not significant differences |
| 3 | _____ + class size + unguided aide | A trend toward reversal of previous gains |

Question: Is a trained teacher important?

A trained teacher is one who has a fundamental mastery of the diagnostic implication of instructional schemes of cognitive therapy and who is able to guide an aide in implementation of cognitive therapy on a small group basis using supplemental instructional materials. The teacher implements cognitive therapy within the curriculum in addition to small group work conducted by the aide. This question must be answered affirmatively with respect to the data from this study. The logic inherent in the above matrix indicates that the trained teacher is the single significant variable in the implementation of a cognitive therapy curriculum.

Question: Is class size important?

From the evidence at hand, it is difficult to reason that class size is important as a single experimental variable. The fact that the treatment conditions were administersd with class size held constant, in light of the trend toward revers of previous gains in the third year of the project (where controls became experimentals and had the then advantage of the small class size), contra-indicates a conclusion in favor of experimental outcomes attributable to class size alone.

Question: Is the aide important?

The fact that the aide was held constant over the project's duration, but functioned in a guided versus unguided condition, suggests that her role was of subordinate importance to the project's outcomes. Clearly, her role in the first year of the project when under the supervision of the trained teacher cannot

be partialled from her role in the second year since it cannot be ascertained whether the gains of experimental subjects carried over into the second project year or were managed by the work of the aide.

The outcomes of this project should not be viewed as surprising or enlightening. For many years, it has been understood that the teacher is the single most important variable in educational outcomes, often independent of curriculum or material to sustain the curriculum. The outcomes of this project conclude in favor of the teacher and the curriculum occurring under the conditions described in the first project year are positive and significant interacting conditions capable of producing considerable intellectual, cognitive, and achievement growth among children.

The effectiveness of this project's focus has to rest mainly in the skills of the teacher assigned the experience of working experimentally with those children in a curriculum markedly unknown in the routine of education. The preparation necessary could not have been gained through her formal teacher training and the fact that she prepared herself through self-study necessarily spoke favorably to personal attributes of curiosity, conscientiousness, and effort.

This project has demonstrated that cognitive therapy is effective when managed by a teacher having such personal attributes but ineffective otherwise. Other academic programs, or other compensatory educational program for that matter, are likely to be effective or ineffective depending largely on teacher training and personal attributes of the teacher.

This study was limited in several ways largely due to problems inherent to **in situ** educational research. Foremost was the absence of a control group, who, for economic reasons, could not be scheduled to experience small class size and placebo supplemental activities by an aide. Statements of the effects of class size and supplemental cognitive therapy treatments in the second and third project years, must be regarded as tentative without this advantage of direct class size and placebo comparisions. Next, the teacher variable, nonetheless important, cannot be assessed in its fullest impact without the advantage of control of curriculum, i.e., the same teacher in cognitive therapy one year but in regular classroom curriculum in another. This latter point could also assist to firm impressions of the direct effectiveness of cognitive therapy. Varying the presence and absence of the teacher's aide over the long term can be viewed as a recommendation for further study.

In concluding this project, despite its limitations, the data are strong statements of the effects of three positive variables, perhaps interacting in yet to be understood or mysterious ways, relating to how schools might go about the job of producing intellectual, cognitive, and school achievement gains among disadvantaged children. The fact that experimental subjects grew in these measured criterion varibles from definitely sub-average to quite average in one year of the interaction of teacher-class size-cognitive therapy speaks favorably to a procedure to ameliorate the information processing deficits of disadvantaged children to, in turn, facilitate academic achievement. This study strongly implicates the teacher as the primary condition for such positive programming for disadvantaged children. Also favorably implicated is a compensatory curriculum that focuses on diagnosis and management of the cognitive differences of disadvantaged children, termed cognitive therapy.

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## APPENDIX A

# A MANUAL FOR TEACHING TEACHERS AND PSYCHOLOGISTS TO USE THE SOI

BY

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## GENERAL INFORMATION

This manual has been developed for use in a Structure-of-Intellect (SOI) workshop. If properly followed as programmed, teachers will be able to transfer and apply a theory of intelligence into instructional activities for students. The text is organized so as to facilitate learning of intellectual objectives for self or group instruction.

A. Suggested Equipment and Text Materials:
   1. Equipment needed:
      a. an overhead projector
      b. a 35mm slide projector
   2. Texts and materials needed:
      a. Texts:
         -Guilford, J.P.: THE NATURE OF HUMAN INTELLIGENCE. New York: McGraw-Hill Co., 1967. Optional. Preferred for theoretical reference. Guilford's model is the SI Model; Meeker's application-SOI.
         -Meeker, M.: THE STRUCTURE OF INTELLECT- ITS INTERPRETATION AND USES. Columbus, Ohio: Charles E. Merrill Publishing Co., 1969.
         -Meeker, M.: SOI TEMPLATES. SOI Institute, 214 Main Street, El Segundo, California 90245.
         -Meeker, M., C, M, E, N & D: THE SOI ABILITIES WORKBOOKS. SOI Institute, 214 Main Street, El Segundo, California 90245.
         -Hunter, Madeline: THEORY INTO PRACTICE PUBLICATIONS. El Segundo, California. Tip Publications, Box 514, 1967.
         -Cote, B., and Gurske, B. THE LEARNING CENTER GUIDE. Sunnyvale, California, CTM. 1972.
         -Forbe, I., and MacKenzie, J.: NOOKS, CRANNIES, AND CORNERS. Nashville, Tennessee, Incentive Publications, Inc. 1972.
         -Meeker, M. "An Evaluation of the Educationally Handicapped Program: Measurables and Unmeasurables." SPECIAL CHILD PUBLICATIONS, EDUCATIONAL THERAPY, Vol. II., Seattle, Washington.
         -Popham, W. J.: EDUCATIONAL OBJECTIVES, Vimcet Associates, Box 24714, Los Angeles, California.
      b. Materials:
         -Stanford-Binet Test Protocol
         -Flow Diagram of the SOI- Fig. 9-1--Meeker Text
         -35mm slide set. Available from SOI Institute for Applied Studies, 214 Main, El Segundo, Calif. 90245.
         -Lesson plan worksheets as per workbook
         -Templates for the Stanford-Binet Intelligence Scale and Glossary of SOI terms--from Meeker Template Package
         -1" wood blocks-- 5 sets of 24 each to represent each cell of SOI model.

B. Directions:
   1. It is suggested that each person work with a colleague. Members reinforce each other's learning when selecting appropriate learning activities. This reinforcement helps to maintain interest. Evaluation of lessons is arrived at more easily through discussion.
   2. Your workshop leader will set goals to have each person achieve all the objectives by the seventh day of instruction, and upon reevaluation in three, six, and nine months following the instruction. All learning

activities are designed to be mastered by the participant because each person must be able to identify and code intellectual aptitudes within the SOI model and to translate these classifications into appropriate learning activities.

3. The assessment sections are designed to show the participant what he/she has and has not learned. There are pre- and post-assessments for the entire package. The answer keys are in the appendix. In addition, each concept has a pre- and post-assessment.
4. Training participants are to perform the tasks suggested in the learning activities. The leader may suggest quest activities not listed in the package; such activities enhance interest in the SOI. The leader should note these extras for future use to be shared with other participants.
5. The material covered in the instructional package may be kept by the instructor to be given to any participant on request for mastery of required objectives. Additional references are noted, but the texts by Meeker and Guilford, and the SOI ABILITIES WORKBOOKS are sufficient to achieve the objectives of this package.
6. It is recommended that teachers implement the SOI strategies in the classroom and that they monitor the progress of the students at specified intervals by developing criterion reference tests.
7. The leader is now ready to administer to participants the pre-assessment for the entire package and then the pre-assessment for Concept #1.

Begin.....

Assessment:

A MANUAL FOR TRAINING TEACHERS AND PSYCHOLOGISTS TO USE THE SOI

name_____

This is a pre-assessment instrument. It will measure your present knowledge about SOI theory and its application in education as it now exists. Please do not guess or refer to your texts.

A. CLASSIFY THE FOLLOWING QUESTIONS ACCORDING TO THE CATEGORIES FROM GUILFORD'S SYSTEM: The categories are (1)Cognition, "C", (2)Memory, "M", (3)Convergent Production, "N", (4)Divergent Production, "D", and, (5)Evaluation, "E". Some questions may fall in one or more categories, but place the question into the category which you think most appropriate.

| | Category |
|---|---|
| 1. Do you think the effective and psychomotor domains should be included in the teaching day? Why? | _____ |
| 2. Interpretation of SOI method of teaching suggests students can be taught HOW TO LEARN. true or false. | _____ |
| 3. Show how the following six items relate to each other: (a)SOI profile; (b)ability assessment; (c)terminal behavioral objective; (d)criteria testing; (e)learning tasks; (f)mastery performance. | _____ |

4. How could the teacher structure a lesson to strengthen the evaluation dimension among pupils? _____
5. A teacher finds a student who evidences a short attention span to be a poor math achiever and a poor speller. The student can read and comprehend well. His vocabulary level is at grade level. The teacher should conclude that: (a)the child is hyperactive and requires medication; (b)the child needs remedial help in math and spelling; (c)the child should be placed in a low math and spelling group; (d)the child's memory needs training. _____
6. Which of the basal readers would you want included in a reading sequence for low students? Why? Or, for the average or above average students? Why? _____
7. If they do not consider the whole child in teaching, teachers are not meeting the educational needs of the students. True or false. _____
8. Write as many words as you can which are similar in meaning to the words INTELLIGENCE. _____
9. Recall the five major abilities. _____

B. Prepare an appropriate instructional activity for your grade level for each item listed below.
   1. The ability to see relations between ideas or meanings of words. CMR

   2. The ability to remember given figural objects. MFU

   3. The ability to estimate appropriateness of aspects of a symbolic system. ESS

   4. The ability to produce a word or idea that conforms to specific relationships requirement. NMR

   5. The ability to relate letters or numbers in many differenct ways. DSR.

C. Please respond to these questions:
   1. The two criteria to remember in developing a reference test are: (The Stanford-Binet Intelligence Scale has these two criteria.)

2. What percentage of an assessment do you want students to achieve before prescribing learning tasks?

3. Convert one of the instructional activities developed in Section B into a complete SOI lesson. Identify who (group or individual), (what behavior desired), conditions and how well or degree of expected performance.

4. How does a teacher's attitude affect a student's self-concept?

5. Code this objective: The ability to remember changes in symbolic information.

* * * * * * *

(pre-assessment- Concept #1)

PART I: SOI THEORY AND EXPLANATION

1. State two major educational problems to which the SOI might effectively be applied.
2. The structure of Intellect is a model of factored intellectual abilities. True or False.
3. Every intellectual ability in the structure is characterized in terms of what three dimensions?
4. There are _____ distinct categories used to identify intellectual factors. What are they?
5. The senior author of the Structure of Intellect (SI) model is _____.
6. Dr. Mary Meeker's major contributions to the use of the SOI are?
7. Name three individuals who have made valuable contributions in SOI research.
8. Demonstrate your ability to use the SOI ABILITIES WORKBOOK. Explain the general strategy to be used when students' learning needs have been identified.
9. Sketch a hierarchy of thought processes which occur as an individual assimilates new information.

CONCEPT #1: SOI Theory and Explanation
CONCEPT STATEMENT: The Structure of Intellect model may be interpreted and translated into instructional classroom exercises.
CONCEPT GOAL: Each person will understand the theory of the SOI model and

its application in eduation.

CONCEPT RATIONALE: Without a thorough understanding of the SOI model and its usage, the classroom teacher will not be able to operate effectively to implement the theory.

SUB-CONCEPT TITLES:

1. Introduction to the SOI
2. Major Dimensions and Sub-Categories of the SOI
3. Operations and Descriptions of Components

SUB-CONCEPT TITLE #1: Introduction to the SOI

SUB-CONCEPT STATEMENT: Guilford and his associates have developed an acculturated model of intellectual aptitudes of intelligence. This model defines testable performances of human intellectual functioning.

OBJECTIVE #1: Each person will explain in not more than five minutes to a colleague the SOI theory and model. Any graphic aid may be used. The explanation must include: (1)Why the SOI reduces the lag between practice and theory; (2)The two-fold goals of education; and (3)Why added skills are required of the school psychologist and teacher.

LEARNING ACTIVITIES:

1. Read the Meeker text-- pages 3-4
2. Read introduction to SOI ABILITIES WORKBOOK.

SELF-ASSESSMENT:

NOTE: PLEASE DO NOT GUESS OR REFER TO YOUR TEXT.

1. Teaching the ability to learn should be considered as equally important a goal as is a mastery of prescribed content.
   True or False. Discuss.
2. The person best qualified to reduce the lag between practice and theory in educational systems is the _____ _____.

OBJECTIVE #2: Each person will explain in not more than 5 minutes to a colleague the rationale for the SOI model. The explanation must include: (1)Two major educational problems to which the SOI might effectively be employed; (2)A definition of cognitive therapy and its goal; (3)A definition of a differentiated measure of one's abilities; and (4)An explanation of student failures in terms of the SOI.

LEARNING ACTIVITES:

1. Read Meeker's text-- Pages 4-7
2. Define cognitive therapy

SUB-CONCEPT TITLE #2: Major dimensions and Sub-Categories of the SOI.

SUB-CONCEPT STATEMENT: The SOI is comprised of three major dimensions. There are fifteen sub-categories used to identify an intellectual ability by initials. Select one sub-category of each of the major dimensions to define.

OBJECTIVE #1: Each person will construct by using wooden or styrofoam blocks or by sketching on paper or the chalkboard, the SOI cube and will name the three major dimensions and the 15 sub-categories with 100% accuracy. Each person will color code the blocks or letter on them.

LEARNING ACTIVITES:

1. Read Meeker's text-- Page 9-26.
2. Construct flash cards--a major dimension on one side and definitions on the other.
3. Quiz self with flash cards and achieve 100% performance.
4. Using the colored blocks, assemble the SOI cube.

SELF-ASSESSMENT:

1. Name the three major dimensions of the SOI.
2. Name the five major abilities.

SUB-CONCEPT TITLE #3: Operations and descriptions of Components.

SUB-CONCEPT STATEMENT: Each dimension and sub-category of the SOI can be clearly defined. The SOI serves a taxonomic purpose and also indicates how information may interact and be interrelated. The SOI theory explains several courses of action an individual follows after he/she has cognized or comprehended new information in the environment.

OBJECTIVE #1: Each person will explain in not more than 10 minutes the five operations or the major abilities. This explanation must include: (1)the names of each operation; (2)an accurate definition of each operation; (3)a flow diagram of the five processes; and (4)a comparison of convergent and divergent production at 100% accuracy.

LEARNING ACTIVITES:

1. Read Meeker's text-- Pages 8-22
2. Prepare matching list--left column the definition, and right column the sub-category or operation. Match correct sub-category or operation to correct definitions.

SELF-ASSESSMENT:

1. Define CMU
2. What is the difference between CMU and NMU?

OBJECTIVE #2: (OPTIONAL FOR PSYCHOLOGISTS) Selecting any references from the bibliography in the Meeker or Guilford text, each person will review orally three historical highlights of the development of the SOI theory. The review should include the name of the principal investigator, the major contributions to the SOI theory, and the title of a current book or research paper of each investigator.

SELF-ASSESSMENT:

1. What initial work of Guilford led to the SOI research?
2. What is a factored theory of intelligence?

LEARNING ACTIVITIES:

1. Read Meeker's text-- Pages 7-9
2. Locate and read three references (Torrance, Bruch, Ball, Gowan, or any supplementary references) from the bibliorgraphy in the Meeker-text-- pages 185-193.

SELF-ASSESSMENT:

1. What contribution did Ball, Torrance, Bruch, or Gowan make to SOI reserach?
2. What are Meeker's main ideas?

OBJECTIVE #3: Each person will explain to a colleague how to transfer a given cell (CMU- Cognition of Semantic Units) to an instructional activity at a 100% accuracy level.

LEARNING ACTIVITY:

1. Read SOI ABILITIES WORKBOOK - Pages i-iv.
2. Locate CMU in SOI ABILITIES WORKBOOK. Study pages 80-81.
3. Prepare list of your own instructional activities similar to examples shown on pages 80-81.
4. Explain the strategy as given on page vii in the SOI ABILITIES WORKBOOK to a colleague.

SELF-ASSESSMENT:

1. Locate CSS in the SOI ABILITIES WORKBOOK. Prepare list of similar instructional activities.
2. Locate ESS and follow the same procedure.
3. Check to see if your lessons are appropriate to your grade level.

4. Are the materials for your activities available?

OBJECTIVE #4: After demonstrating ability to develop an instructional activity for CMU, each participant will select any two other cells from the cube at random and in a similar manner develop an instructional activity for each.

LEARNING ACTIVITIES:

1. Select two cells from each of the five operations. Locate corresponding page in SOI ABILITIES WORKBOOK.
2. Select a similar learning task to those specified in the workbook for each cell selected in question.

SELF-ASSESSMENT:

1. Locate MMR in the SOI ABILITIES WORKBOOK-- prepare additional materials to achieve the same activity.
2. Locate DMR and follow the same procedure.

OBJECTIVE #5: Using Figures 1-3 from Meeker's text, each participant will construct a hierarchy of thought processes as an individual assimilates new information. Any graphic means may be used. An oral explanation must accompany the graphic presentation and should be completed in less than five minutes.

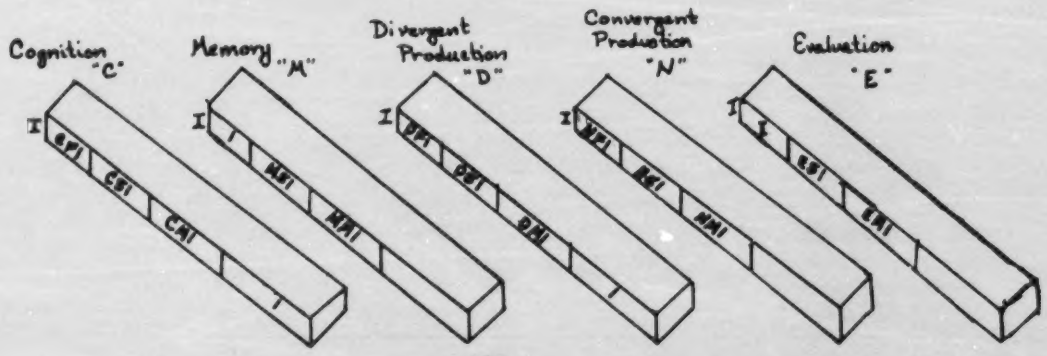
LEARNING ACTIVITES: Meeker's text.

1. Read pages 103-112
2. Study figures 1-3 on page 173
3. Use figures 1-3 to trace the routes of information once the organism has cognized or comprehended it thoroughly.

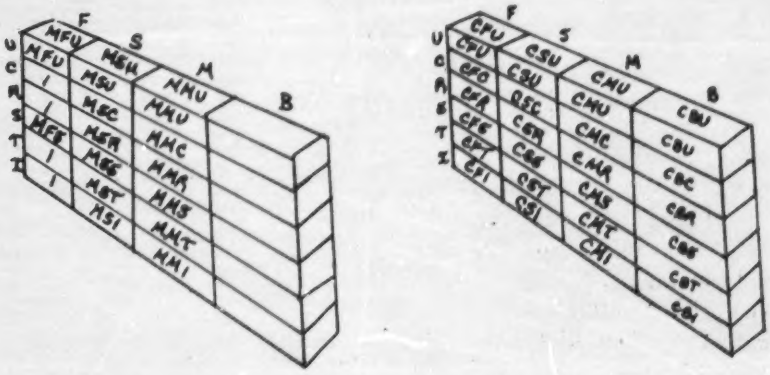
SELF-ASSESSMENT:

1. Explain the "Aha" phenomenon in SOI terms.
2. Which arrows on the flow chart figures 1A show flow in both directions? Which show one direction flow?
3. Have the group build the SOI model using the 120 one-inch wood blocks. (It is recommended that each person be given at least five random blocks representing a different ability.) If wood blocks are not available (1"cubes cut from 1 x 1 piece of lumber), use styrofoam to make the blocks. Magic markers of different colors can be used to mark each of the operations.
   Each person will be able to cooperate in placing his blocks in the correct spot in the model. Thus the participant will learn visually-motorically more block placements than the five assigned to him.
   Construct incrementally, block by block, the SOI model as follows:

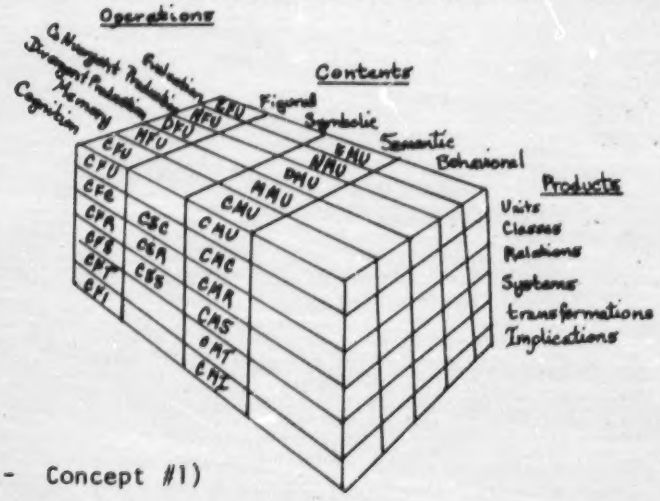
STEP 1: For each "operation" lay down the first row of blocks for the product "implication."



STEP 2: Build a "wall" for each operation using the sequence as shown:



STEP 3: Bring all of the "walls" together to make Guilford's "cube."




(post-assessment- Concept #1)

## SOI THEORY AND EXPLANATION

Name_____

1. Using any graphic aids, explain to a colleague the following: (Each item should not take longer than 5 minutes)
   a. The SOI theory and model.
   b. The rationale (why) for using the SOI as a curriculum base.
   c. The construction of the SOI cube including the three major dimensions and sub-categories.
   d. An explanation of the five operational areas.
   e. Three historical highlights of the development of the SOI theory.
2. Explain how to transfer CMU (Cognition of Semantic Units) to an instructional activity.
3. Explain two other cells chosen at random the same way as in objective #2.
4. Construct a hierarchy of thought processes as an individual assimilates new information.

The post-test is an oral examination. Your performance will be evaluated by a colleague as excellent, average, or poor.

* * * * * * *

PART II: INTERPRETATION OF THE SOI

1. From a given Stanford-Binet protocol, define the following terms: basal, ceiling, MA, CA, IQ.
2. Describe the steps required to translate a Stanford-Binet test results into an SOI profile.
3. Interpret the following SOI profile as shown in Figure 1A. Identify the student's strengths and weaknesses.
4. Using the profile in Figure 1A, prescribe two curricular activities to enhance the student's strengths and to remedy weaknesses.
5. SOI code the following acts of intelligence:
   a. Solve a multiple choice vocabulary test.
   b. Recognize musical compositions heard earlier.
   c. Of four given class names, select the one to which the given object test belongs.
   d. Locate faces hidden in complex picture scenes.
   e. Write words containing some specified letter.

CONCEPT #2: INTERPRETATION OF THE SOI

CONCEPT STATEMENT: By proper interpretation of the SOI, the psychologist or teacher is able to plan for each student's individual learning needs.

CONCEPT GOAL: Each person will understand how to use each student's intellectual differences to prescribe curriculum especially for her/him, so as to teach HOW to learn as well as WHAT to learn.

CONCEPT RATIONALE: The SOI profile has little value for the teacher unless the test results can be translated, thereby making it possible to individualize the learning experiences according to the component abilities indicated on these profiles.

SUB-CONCEPT TITLES:

1. Construction of an SOI Profile
2. Analysis of a Student's SOI Profile
3. SOI Coding of Factors of Intelligence

SUB-CONCEPT STATEMENT: The Stanford-Binet test results can be translated into an SOI profile of a child's intellectual abilities. Using the profile, the psychologist or teacher can individualize the learning experience according to the component abilities indicated on the profile.

OBJECTIVE #1: Given an unidentified Stanford-Binet test protocol (to be supplied by school psychologist), with the use of an SOI template, each person will develop an individual SOI profile using a factor count of accumulated expectancies for operations in less than 30 minutes.

LEARNING ACTIVITIES: (Participant will need 5 differently colored pencils)

1. Read Meeker's text- Pages 123-4
2. Obtain and familiarize oneself with SOI templates and a Stanford-Binet test protocol.
3. Place template over page of Stanford-Binet protocol to correspond with basal age. Using minus (-) for incorrect and plus (+) for correct,

# Profile and Tally Sheet For S.O.I. Analysis of the BINET [LM] REVISED

Name: Male
CA: ____ Date: ____
Basal: ____
Ceiling: ____
IQ: 90

## "M" MEMORY

| FIGURAL | SYMBOLIC | SEMANTIC | |
|---|---|---|---|
| MFU | MSU – | MMU | UNITS |
| | | | CLASSES |
| | | MMR – | RELATIONS |
| MFS = | MSS – | MMS | SYSTEMS |
| MFT | | | TRANSFORMATIONS |
| | MSI – | | IMPLICATIONS |

## "D" DIVERGENT

| FIGURAL | SYMBOLIC | SEMANTIC | |
|---|---|---|---|
| | DSU | DMU | UNITS |
| | | | CLASSES |
| | | DMR | RELATIONS |
| | | DMS +– | SYSTEMS |
| | DST ++ | DMT + | TRANSFORMATIONS |
| | | DMI | IMPLICATIONS |

## "E" EVALUATION

| FIGURAL | SYMBOLIC | SEMANTIC | |
|---|---|---|---|
| EFU | | EMU –– | UNITS |
| | | | CLASSES |
| EFR | ESR | EMR +++ | RELATIONS |
| EFS | | EMS ++ | SYSTEMS |
| | | EMT | TRANSFORMATIONS |
| EFI | | | IMPLICATIONS |

## "C" COGNITION

| FIGURAL | SYMBOLIC | SEMANTIC | |
|---|---|---|---|
| CFU | | CMU +++ = | UNITS |
| CFC | CSC ++ | CMC | CLASSES |
| CFR | CSR | CMR | RELATIONS |
| CFS = | CSS + | CMS | SYSTEMS |
| CFT ++– | | CMT – | TRANSFORMATIONS |
| CFI ++ | | CMI + | IMPLICATIONS |

## "N" CONVERGENT

| FIGURAL | SYMBOLIC | SEMANTIC | |
|---|---|---|---|
| NFU | | NMU | UNITS |
| NFC | | NMC | CLASSES |
| NFR + | NSR | NMR | RELATIONS |
| NFS – | NSS +– | NMS ++ | SYSTEMS |
| | | NMT – | TRANSFORMATIONS |
| NFI | NSI + | NMI + | IMPLICATIONS |

1) Learning takes place through cognition
2) Learned material is stored in memory
3) Production of learned material
   a) Unchanged or convergent (encoded)
   b) Reoriented or invented (divergent)
4) Evaluation may be done of new or old learned material.





Adapted by Mary Meeker from Guilford, Copyright, 1963

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tally items from the window in the template to same cell or cells in flow diagram.

4. Continue scoring (+) or (-) through ceiling.
5. Use one colored pencil for tallying basal items, other colors for each age level, and another color for plotting ceiling items.
6. Count the plus signs in each major operation and write the total in the margin near the block it tallies. Add the plusses to the number of responses shown at the year preceding the basal. See table 9-1 (Meeker text).
7. Make accumulated totals for operations, contents, and products after counting all responses separately.

SELF-ASSESSMENT:

1. From a given Stanford-Binet protocol define the following terms: basal, ceiling, MA, CA, and IQ.
2. What do the plus signs suggest? The minus signs? If a child is given 2 months mental age for each item tested, the plus or minus is approximately equal to 2 months of mental age (MA), too. (Age 2 to 4.6= 1 month of MA).

SUB-CONCEPT TITLE #2: Analysis of a Student's SOI Profile.

SUB-CONCEPT STATEMENT: After translating the Stanford-Binet test results into the graphic profile of a child's intellectual abilities, the teacher or psychologist is able to do a specific identification of potential strengths, weaknesses or abilities and disabilities.

OBJECTIVE #1: Given an SOI profile for any student, each person will list the child's strengths, weaknesses, or abilities and disabilities.

LEARNING ACTIVITIES:

1. Read Meeker's text- Pages 155-180 and page 124
2. Study student's profile plotted in previous learning activity. Interpret the results.
3. Look for peaks and valleys on profile to detect the strengths and weaknesses of the student. Express your findings in SOI task terminology: the letter for operation first (C), then the content (F) and lastly the product (C) = CFC.

SELF-ASSESSMENT:

1. Using the SOI profile you just developed, ask if any of the five operations is stronger or weaker than others?
2. Is the student passing or failing in any horizontal dimension: search· units, then classes, etc., on through implications?
3. Where are his strengths and weaknesses?
4. Is he passing or failing in any vertical direction figural through semantic?

SUB-CONCEPT TITLE #3: SOI Coding of Factors of Intelligence

SUB-CONCEPT STATEMENT: Each factor of intelligence can be SOI coded. A child's intellectual strengths and weaknesses must be SOI coded correctly in order to properly use the SOI Abilities Workbook.

OBJECTIVE #1: Given 20 factors of intelligence taken from the objectives in the SOI ABILITIES WORKBOOK, each person will code at least 15 of them by using the SOI ABILITIES WORKBOOK. Allow 2 days for this concept.

LEARNING ACTIVITIES:

1. In the SOI ABILITIES WORKBOOK, read page ii. Learn that the objective given in each lesson is the definition of a factor in intelligence or an ability.
2. Study any 20 lessons. Name the specific instructions (right side of page) for developing that kind of intelligence. Give two similar

examples.

3. Make flash cards. Write the definitions of intelligence on one side and the correct code description and abbreviation on the other side.
4. Exercise with the flash cards until 100% accuracy is achieved.
5. Trace through decision flow charts in text pages 114-116.

SELF-ASSESSMENT:

1. Into SOI terms code as many kinds of intelligence involved in the following tasks as possible.
   a. assembling a plastic model airplane
   b. reading and answering mathematical thought problems.
   c. taking a spelling test

KEY:

a. CFR, CFS, NFR, NFS
b. CSI, MSI, NSI
c. MSI, NMU

* * * * * * *

(post-assessment- Concept #2)

INTERPRETATION OF THE SOI

Name_____

1. Given 10 tasks (from SOI ABILITIES WORKBOOK), code at least 5 in SOI terminology.
2. Identify the strengths, waknesses, or abilities and disabilities of a given student from his/her profile of abilities.
3. Prescribe at least 10 teaching techniques (curricular activities) to meet the needs of the student as identified on objective #6. The SOI ABILITIES WORKBOOK may be used.

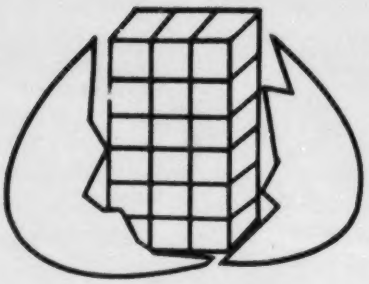
* * * * * * *

PART 3-4: APPLYING THE SOI TO LEARNING TASKS

(Pre-Assessment-- Concept #3)

DEVELOPING SOI LEARNING EXPERIENCE

1. Write a precriptive lesson for each of the following abilities appropriate to your students' interest and age level. (These pages are from the SOI ABILITIES WORKBOOK and reprinted by permission of the author).
   a. CFT  c. EMU  e. DFI
   b. MMS  d. DMR
2. Given the following SOI profile, page 172 from Meeker's text, write two SOI lessons designed to strengthen any one of the identified strengths and weaknesses (see Fig. 2A).



SUBJECT: Reading/Music/Math

**GRADE LEVEL:**

K 1 2 3

CFU-A 1

**OBJECTIVE:** To develop the ability to perceive auditory figural units (sounds) by organizing groups of successive inputs. (COGNITION OF FIGURAL UNITS-AUDITORY)

**MATERIALS**

A. Prepare a tape of two or three rhythm patterns
Rhythm sticks or other instruments
Duplicated page with rhythm patterns using dash for a long sound and dot for a short one as follows:

1. — . . — .— — —

2. . . . — — . . — . — — —

These may be put on the board
Crayons (or colored chalk for blackboard exercises)

B. Coffee cans, one for each student
Pencil
Colored paper cut to go around each can. Paste

C. Favorite records or tapes brought from home.

**INSTRUCTIONS**

GENERAL:

Use this and many similar ones for non-attentive students.

SPECIFIC:

A. 1. Play rhythm #1. Repeat it.
2. Have the child repeat the rhythm with the rhythm sticks.

B. A week prior to this task, ask children to bring a coffee or other can. The teacher begins this game by clapping once and asking children to tell her how many times she clapped. She varies the amounts of claps and then taps the pencil on the can, asking for the same response.

SPECIFIC:

"This week we will decorate our coffee cans with paper. Make a design and paste it on the can."

Call on individual class members to clap or tap various beats for students to recognize. First tap out a rhythm to be repeated. Later, tap out a song to be identified.

Play at least three songs. All listen. Students tap out rhythm after listening to the recordings. Other students are to guess which song was tapped out.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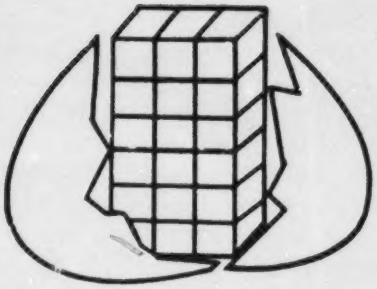


**GRADE LEVEL:**
K 1 2 3 4 5 6

EFT-2

**OBJECTIVE:** The student will be able to develop the ability to judge or analyze how a given figure or object will appear after certain changes have been made, such as folding, rotation, etc.

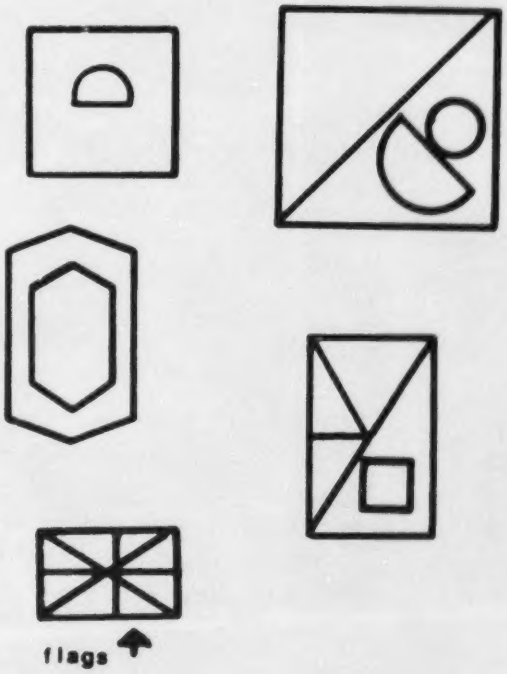
EVALUATION OF FIGURAL TRANSFORMATIONS

## MATERIALS

Following assortment of shapes:

Small circle
Small semicircle
Large semicircle
Square
Triangles (large and small)
Hexagon
Small square

Pictures of figures composed of the specific shapes:



flags

## INSTRUCTIONS

GENERAL:

Have a display of the given geometric shapes.

SPECIFIC:

Teacher asks the child to indicate which geometric shapes would be needed to make each given figure.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## GLOSSARY FOR SOI FACTOR DEFINITIONS

### COGNITION

CFU -Ability to identify objects by name, visually and auditorially
CFC -Classifies perceived objects
CFR -Ability to discover relations in perceptual material
CFS -Perceives spatial patterns and maintains orientation
CFT -Manipulates or transforms objects into another visual arrangement
CFI -Explores visually ways to select most effective action

CSC -Discovers complex relationships, patterns, or systems
CSR -Discovers relations involving letter patterns
CSS -Ability to discover complex relationships forming patterns or systems

CMU -Vocabulary
CMC -Ability to identify classes of words
CMR -Discovers relations in conceptual, abstract meanings.
CMS -Ability to comprehend or structure problems in preparation for solving them
CMT -Sees several meanings to a word or expression
CMI -Anticipates needs or consequences of a given situation

### MEMORY

MFU -Recalls materials learned by visual and auditory presentation
MFS -Recalls arrangement of objects previously presented
MFT -Memory for transformations of figural material previously changed

MSU -Recalls for immediate production after one presentation a series of numerals or letters
MSS -Memory for a system of numerals, symbols, or letters
MSI -Memory for well-practiced number operations

MMU -Reproduces previously presented ideas or words studied
MMR -Remembers meaningful pairs of words
MMS -Remembers order of materials or events presented visually or auditorially

### EVALUATION

EFU -Ability to identify identical forms
EFR -Ability to evaluate figural relationships
EFS -Ability to evaluate and decipher systems, beginnings, and ends
EFI -Sensitive to problems, spatial, seeing defects and deficiencies and suggesting improvements

ESR -Decides which symbol relations are consistent with others in a series

EMU -Ability to apply varied word meanings
EMR -Uses logical relationships in testing correctness of conclusion
EMS -Appraises aspects of common situations in terms of experience
EMT -Practical judgment about ideas

**GLOSSARY FOR SOI FACTOR DEFINITIONS [CONTINUED]**

**COVERGENT PRODUCTION**

NFU -Ability to comprehend and reproduce an observed bit of behavior

NFC -Ability to sort or classify
NFR -Ability to deduce figural relationships
NFS -Reproduces a system of figural design
NFI -Ability to solve simple equations in terms of familiar forms

NSR -Finds nonverbal response to fulfill a given relationship between numerals or letters
NSS -States the order of symbolic systems from start to goal correctly
NSI -Substitutes or derives symbols as expected

NMU -Ability to state correct names of concepts and ideas
NMC -Forms correct groups from a large number of words or objects
NMR -Ability to correlate semantic representation
NMS -Arranges objects or events into a meaningful sequence
NMT -Shifts function of objects or part of something to use in a new way
NMI -Ability to state the correct deduction from given facts

**DIVERGENT PRODUCTION**

DFC -Reclassifies perceived objects in various ways

DSU -Produces words fulfilling specified structural requirements
DSR -Generates a variety of relations between numbers or letters
DSS -Produces symbolic systems in unique ways
DST -Divergent production of transformations made to symbolic material

DMU -Ability to call up many ideas in a specified class
DMR -Produces words from given words as synonyms, or as associated words
DMS -Analogical completions
DMT -Ability to produce remotely associated, clever, or uncommon responses
DMI -Specifies details that develop a scheme or variation of an idea

Divergent production and the transformation and implications dimensions are all indicators of creative potential. A balance of two or more pluses or minuses is significant for program planning.

WISC-R Analysis

## STRUCTURE OF INTELLECT ANALYSIS OF THE WISC-R TEST

**Materials Needed:**

4 WISC-R Templates
Profile and Tally Sheet for S.O.I. Analysis of the WISC-R
Chart - Expected Factor Score by Age for the WISC-R Verbal Subtests
Chart - Expected Factor Score by Age for the WISC-R Performance Subtests
Chart - Accumulated Totals of Expected Scores by Age Levels for the WISC-R excluding coding A and B.

**Instructions - General**

1. The templates are designed to match exactly the pages of the WISC-R Protocol so that when you cut out the windows (as indicated) the response scores will be visible for tallying. For the Vocabulary Subtest, all items measure one SOI ability and therefore there is no window cutout. For this subtest simply tally the number of words correctly defined to get the total tally.

2. In tallying the SOI factors, credit is given for each correct response regardless of the quality of the response. On the templates and for each subtest you will find specific instructions to this effect.

**Instructions - Specific:**

1. Place the template over the appropriate page of the WISC-R Protocol.
2. Tally items correct for each window on the template (Correct credit instructions are printed on the templates for each subtest.)
3. The tally number for each factor designated on the template should then be recorded on the "Profile and Tally Sheet" in the box for that specific factor.

**Example:** In the Information Subtest a student received a 0 for factor MSS. In the Digit Span Subtest she received 4 for MSS in Digit Backwards. In the Picture Completion Subtest she received 1 for factor MSS. These tallies should be recorded on the tally sheet as shown in Figure A below:

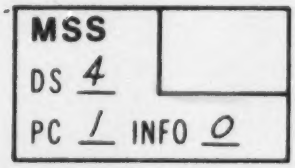


Figure A

For a comparison of expected achievement in a specific factor, the following example is given for factor MSS:

**Example:** Total the number of tallies for the factor and place this number in the upper right-hand corner of the "tally box". See Figure B on page 45. Then refer to the "Expected Factor Score Charts" to determine expected number for that factor. In this example you need to look under each of the three subtests that measure that factor. The age of the child in this example is 8 years 4 months. Therefore her expected total for MSS is 4. This number would then be entered under the tallied number of 5. See Figure B on Page 45. You can see from analysis that this girl is a little above her expected achievement in MSS.

**Instructions - Specific: [Continued]**

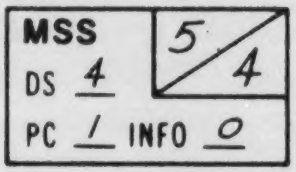


Figure B

4. Record the tallies for each factor under each subtest on the "Expected Factor Score Charts". To do this all you need are the two charts and the "Profile and Tally Sheet".

   a. Go down the age column and find the chronological age of the student.
   b. Take a red pencil and draw a line through the age across the chart. **Note:** This will give you a base line on which to determine strengths and weaknesses.
   c. Now plot the number achieved under each factor for each subtest on the chart. **Note:** If the expected factor score is the same for many ages plot the score closest to the student's chronological age.

5. To plot an "Operations-Contents-Products" profile, you need the "Profile & Tally Sheet" and the "Accumulated Totals of Expected Scores Chart." The following procedure should be employed:

   a. Go down the age column and find the chronological age of the student.
   b. Take a red pencil and draw a line through the age across the chart. **Note:** This will give you a base line on which to determine strengths and weaknesses.
   c. Count the total number of tallies for each operation and record this number under the specific operation on the chart. **Note:** If you gave the Maze Subtest you would use the "Cognition w/ Mazes" column rather than the cognition column. The same is true for Memory and Digit Span.

      **NOTE:** DO NOT TOTAL THOSE TALLIES FOR "CODING A OR B".
   d. Count the total number of tallies in each of the content areas. For example total the number of Figural tallies in all operations **Note:** Use the correct columns to plot your totals.
      **NOTE:** DO NOT TOTAL THOSE TALLIES FOR "CODING A OR B".
   e. Count the total number of tallies for each of the Products. For example total all units regardless of the operation or content and plot the number in the correct column. **Note:** Use the correct columns to plot your totals.

      **NOTE:** DO NOT TOTAL THOSE TALLIES FOR "CODING A OR B".

6. You are now ready to select curriculum based on the individual child's unique test responses. The **SOI ABILITIES WORKBOOKS** are coded to match the factors you have just identified.

**NOTE:** MSS WAS USED AS THE EXAMPLE BECAUSE IT IS MEASURED UNDER THREE SUBSTESTS.

**INTERPRETATION:** Look for pattern indications as follows:

1. Is the student above or below his expected achievement?

**Instructions - Specific: [Continued]**

2. Is any one of the four operations (Cognition, Memory, Evaluation, or Convergent Production) stronger or weaker than others? If so, how does this reflect in his achievement in school. **Note:** Divergent Production is not measured in the WISC-R.

3. Is the student passing or failing in any horizontal dimension in one of more of the operations (units, and Relations through Implications)? **Note:** Classes are not measured in the WISC-R. Can the teacher orient curriculum toward his weakness or strength?

4. Is the student passing or failing in any vertical direction? Is he strong in symbols but weak in semantics or vice versa? For example, is he strong in symbols but doing poorly in arithmetic, then why? If he is poor in the semantic area, then is it at the concrete (Units) level only? At the Implications level only? General weakness?

**Teaching Strategies:** Should proceed in this manner:

1. Any identified strength in an SOI ability (i.e. EFR) should be taught as coded in the SOI Abilities Workbooks. Select tasks closest to the student's grade range.

2. Any identified weakness in an SOI ability (i.e. MMU) should be taught as coded in the SOI Abilities Workbooks. Select tasks closest to the student's grade range.

3. When in doubt the general procedure is to teach Figural content before symbolic and symbolic before Semantic. We call this a horizontal strategy. A similar procedure in the vertical dimension is to teach Units down through Classes and Relations with Implications being the most abstract and complex and therefore the most difficult.

4. An alternate strategy is as follows: Teach a strength before a weakness or alternate strength with a weakness.

5. Using the Accumulated Total of Expected Scores by Age Levels for the WISC-R Chart, the following strategy may be employed: Teach an Operations weakness using strengths in Content and Products. Teach a Contents weakness using the strengths in Operations and Products and teach a Products weakness using the strength in Operations and Contents.

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**APPENDIX B**

# USING COGNITIVE ABILITIES AS THE DIAGNOSTIC BASIS FOR CURRICULUM PLANNING

By

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## USING COGNITIVE ABILITIES AS THE DIAGNOSTIC BASIS FOR CURRICULUM PLANNING*

**Mary N. Meeker, Ed.D.**

There are five major abilities involved in intelligence (Guilford's Structure of Intellect--SOI). The Stanford-Binet tests a majority of these abilities. By the use of templates, psychologists can translate componets of IQ's from the Binet to the SOI so that individual curriculum planning can be done. The advantages to this procedure are twofold:
(1) The Binet, which was never based on a theory of human intelligence, can now be used diagnostically to show componets of intelligence instead of a simple IQ score. (2) Teachers can provide experiences for the child which are within the realm of the school responsibility--that is, knowing what a child can or cannot do intellectually will allow the teaching of cognitive abilities which will get him ready for learning.

| Take IQ test results | → | The psychologist, using an item-by-item analysis, translates mental abilities into curricula terminology | → | SOI PROFILE | → | Individual pattern of strengths and weaknesses | → | Individual** program |
|---|---|---|---|---|---|---|---|---|
| (1) | | (2) | | (3) | | (4) | | (5) |

If you do not have acess to a profile begin teaching from the workbooks in this order. Learning flows from Cognition (1) to the other abilities. Remember intelligence is not ordered by grade level, therefore, a student's responses (success or failure) to a task are self-diagnostic.

### 1. COGNITION

The child who is high in **comprehension** catches on easily, is generally alert to things in the environment. The child who is low in cognition needs much prompting, repetitive trials, may take in things better through his ears than his eyes, or through his hands, or through his eyes primarily. Educationally handicapped children show no group patterns in cognition. Brain-damaged children will show deficits here or real strengths here with problems instead in the production areas. Cognition is the beginning. Children with the same IQ score can be either high or low in Cognition!
COGNITION TASKS THE TEACHER CAN DEVISE (Use vocal inputs, visual inputs, and kinesthetic inputs where possible)

(1) Teach children to identify objects by name (CFU)
(2) Provide pictures and words and numbers which they can classify (CFC, CSC, CMS)
(3) Find pictures which are related to each other, let child find the relationships (CFR)
(4) Give him figures which he must transform into another shape using the same figure (CFT)
(5) Let him discover complex relationships, patterns, or systems in material (CFS, CSS, CMS)
(6) Let him structure problems for others to solve (CMS)
(7) Teach and ask for several meanings to any word or expression (CMT)
(8) Let him anticipate the needs or consequences of a given situation (CMI)

*May be used after Meeker Templates have been applied to a test.
**SOI Abilities Workbooks are available for programming planning.

### 2. MEMORY

Nearly all EH children who are educationally retarded show poor or deficit memory abilities. They need structured tasks which will train their memory. Program 20-minute sessions three times a week minimally.
MEMORY TASKS MAY BE VARIED (vocally, visually, kinesthetically).

(1) Have him recall material learned by visual or auditory presentation (MFU, MMU, MSU)
(2) Have him recall arrangement of objects previously shown to him (MFU)
(3) Have him recall for immediate production after one-or two-second presentations a series of numerals or letters (MSU)
(4) Drill in each type of mathematics operation (MSI)
(5) Present a paragraph. Have him recall as many of the ideas as he can (MMS)
(6) Have him make up problems for others to solve and let him grade their answers (MSS, MSI, MMS, MMR, MMI)
(7) Give him a page of reading words in scattered order. Let him study it, then tell how many there were and what they were (MMU)
(8) Present related pairs of words to him on a page. Have him recall them after study (MMU, MMS)
(9) Have him remember the order of events which have been presented visually or auditorially (MMR, MMS)

### 3. EVALUATION

Children who show evaluation deficits are very often behavior problems and act out. They do not know how to "read" their environment correctly. They do not have foresight and do not know how to plan, nor do they take responsibility. They need to be given opportunities to make decisions, lead committees, learn how to make evaluations.* Use Behavior Modification techniques to reward correct decisions.

(1) Have them comprehend a gesture and reproduce this bit of behavior (EFU)
(2) Have them make judgments about how materials can be sorted and classified (EFC)
(3) Give them codes to break (EFR)
(4) Present problems, spatial, numerical, or semantic, and have them see the defects or absurdities and suggest improvements (EMR, EMI)
(5) Give them numerical series to choose the number not related (ESR, ESS)
(6) Have them select several words which may be used in place of each other to get the same or different meanings (EMT)
(7) Show their logic in testing correctness of conclusions (EFI, ESI, EMI)
(8) Have them appraise aspects of common situations in terms of experience (EMR)
(9) Give them practical judgments about ideas that are presented (EMS)

*Give these same suggestions to parents.

### 4. CONVERGENT PRODUCTION

This is called the "school block" of abilities. These are tasks and often tests where children must come up with the correct solution, unchanged from the way it was taught. (Also called regurgitation) Highly conforming students do well here. Usually the superior student reproduces exactly what the teacher wants and is often, therefore, misjudged as "gifted". These children usually write neatly, spell well, and generally do what is expected of them in school. The too-conforming child needs divergent-production tasks to make him more flexible and capable of meeting unexpected situations. The child who is poor at convergent production needs to be taught how to reproduce exactness.

(1) Give them figures to reproduce, exercises to mimic (NFU)
(2) Give them major classes in which to sort pictures, words, or numerals (NFC, NSC, NMC)
(3) Give them deduction problems (NMR)
(4) Give them blank spaces in sentences or numerical series to fill in (NMU)

(5) Have them solve simple equations vocally (NSU, NSI, MSI)
(6) Have them state the order of symbolic systems from start to goal correctly (NSI)
(7) Give them concepts or ideas for which they must give the correct name (NMI)
(8) Have them show relations between ideas (NMR)

**5. DIVERGENT PRODUCTION**

This ability is usually considered a creatively constructive use of intelligence. Children who score high here are usually flexible, filled with ideas, good at unusual ways to solve problems, self-confident, and free from anxiety. The child who is poor in divergent production is often highly anxious, not self-confident, and unable to be flexible.

(1) Have him reclassify objects, pictures, numbers, and words (DFU, DSU, DMU) in unusual ways.
(2) Have him generate a variety of relations between numbers, letters, or ideas (DMU, DSU, DFU)
(3) Give him opportunities to say as many words as he can in a minute; the same with ideas in a specified time vocally or on paper (DMU)
(4) Have him produce words from given synonyms or associated words (DMR)
(5) Have him produce clever titles, uncommon ways of using common objects (DMI)
(6) Allow brain storming without making value judgments about the result. Build one solution with alterations to another solution.

There are several programs available from the SOI Institute. First, there is an SOI test which will give the student a profile in 16 of the abilities. It is teacher scorable.

Second, there are workbooks for each of the factors tested on the test so that in-depth training is available before subjecting the student to more academic work for which he is not prepared to learn intellectually.

Third, there are general workbooks for each of the five major abilities. There is a composite workbook for pre-schoolers and a Convergent Workbook for Gifted K-12.

Fourth, there is a computer program for interpreting the Binet and Wiscs which will also identify for a special individualized workbook the students' strengths and weaknesses.

**THE DIAGNOSTIC USE OF THE BINET, WISC, WAIS, AND WPPSI FOR INDIVIDUAL CURRICULUM PLANNING**

10 TEST RESULTS ——Item by item translation——→ SOI* PROFILE ——Proficiencies and deficiencies——→ INDIVIDUAL CURRICULUM

Reading diagnosticians have long used various reading tests to assess individual weaknesses contributing to retarded reading rates and based remedial teaching on the results. The Meeker SOI analysis of tests will allow Psychologists to use tests of individual intellectual abilities in a similar manner.

The system drawn above will allow psychologists to do more than return a unitary score to a teacher (or cum folder); it diagnoses those abilities which make up the learning process. The structure-of-intellect

(SOI) analysis is used as the intermediary between the administration of the intellectual assessment and the selection of instructional materials.

After the Binet (WISC or other test) has been plotted into the SOI profile via templates**, a dimensional weakness or individual cell can thus be defined and used to program materials to remediate the weakness or identify the strength(s). A simple count of the successes in each major block of abilities will also give an ACCUMULATED SCORE BY AGE LEVELS which can be interpreted as an expansion of SOI abilities into mental ages for the five major operations.

By way of more complete interpretation, the reader is referred for specific suggestions to the book, **THE STRUCTURE OF INTELLECT: ITS INTERPRETATION AND USES**, Charles Merrill Publishers, 1300 Alum Creek Drive, Columbus, Ohio 43216, or to Guilford's book, **THE NATURE OF HUMAN INTELLIGENCE**, McGraw-Hill. A program of materials to fit each cell or factor is available.

Research since 1962 shows that the following patterns typify certain clinical types, and this information may serve as a guide for interpretation: (A weakness is usually identified as any cell in which the failures outweigh the successes by more than two--in Operations, more than one year below the Binet MA. A plus or minus equals 2 months of mental age in the Binet.)

1. Gifted children and mentally retarded children show **individual** patterns. They may be weak or strong in any dimension and thus need to have programs based on the strengths (as in the case of MR's) and both weaknesses and strengths as dependent upon the individual, for the gifted.

2. **Memory** is invairably the weakest area for the educationally handicapped and relatively slow learner. Specific instruction and experiences in memory need to be prescribed to the teacher when this pattern is found.

3. Brain damaged may or may not show memory weakness, but often show **encoding** (Evaluations and Productions) weaknesses, or **decoding** (Cognition) weaknesses, or oppositional strengths. If they also show Memory weakness (Association), educational achievement is further complicated. In these instances tie prescriptive tasks to strengths.

4. Good patterns in divergent production usually are significantly related to personality patterns in which good self-concepts exist. Poor patterns in divergent production usually typify the highly anxious or the child who has a poor concept. Such possibilities may indicate personality strengthening needs to supercede the academic.

5. Children who show weaknesses in Relations dimensions are usually found to be very literal-minded and do not work independently too well; they need constant instruction and feedback before they can go on. They need specific experiences to build up their abilities to see or work at a relations level and relations need to be taught specifically.

6. Children who show weaknesses in Units levels are most often those who have perceptual difficulties and need to go back to a much lower level of stimulation or readiness performance. This is often correlated with poor reading ability even though the IQ scores are average or better.

7. Children who have Units and Figural deficiencies may need to be checked for visual problems.

*Adaptation of Guilford's SI Model

**Other Templates are available from the SOI Institute.

These children have difficulty with concrete representations of abstract concepts. They have problems in gestalts generally and need experience in motor areas as well as in concrete experiences. Give them psychomotor tests. If they are boys, look into the emotional realm for more information.

8. Children who have Symbolic deficits, naturally, will have weaknesses in arithmetic.

9. Children who show strengths in Transformations and Implications may be the most creative, abstract thinkers. If so, recommend for them that they be allowed to have periods where they can manipulate concepts either in social studies, history, or art--where they can go off on tangents and "fail-safe". Encourage constructive creativity.

10. Systems deficits are more difficult to generalize--these are children who do not grasp totalities or beginnings and how they end--they do not see causal effects. For them, exact explanations and showing of relations may be necessary. Naturally, assignments where this ability is demanded will be very difficult for them regardless of IQ score. Teachers need to be alerted to this intellectual deficit. If a student shows strength in Systems, give him/her more freedom and full reign to develop this strength. It is the mark of the budding entreprenur especially when combined with strong Evaluation.

11. There are too few classification items to have produced repeated patterns. Nevertheless, we have found in the EH classes that giving those with units weaknesses and remedial reading levels a series of cards to be classified also tends to build up units discriminations as well as classifications skills. Classification is thought to underlie concept formation ability (Bruner; Goodnow & Austin, Cagne; Kendler; Reynolds). This is your back-up ability for poor learners. When in doubt, begin at the **classification** level.

12. Blind children show definite group patterns based on the Hayes-Binet. Those under 140 IQ show severe deficits in the Figural and Relations dimensions. They need special experiences in these areas. Those over 140-IQ scores show the same patterns as the gifted do--individual ones. The more disturbed they are, the more it shows up in Divergent Production. If there are problems in social situations it shows up as deficits in Evaluation of Semantics factors.

13. Behavior problems and acting-out children usually show severe deficits in Evaluation items. They need specific training in reality evaluation and decision making. Time must be scheduled for independent training of these skills.

14. Deaf children show high Memory, high Figural and Low Semantic ability. Use the workbooks to develop their strengths (Sue Lester, Katheryn Holland); and discuss these strengths with parents and teachers. If is my belief that the intellectual abilities can be internally mediated without semantic language. We are beginning research in this area now.

It is likely that significant results will be obtained with individually planned SOI curriculum if the teacher teaches SOI strengths or weaknesses three times a week for 20 minutes.

Mary Meeker, Ed.D.

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**APPENDIX C**

# PRE-SERVICE INSTRUCTION PROGRAM
# COGNITIVE THERAPY CURRICULUM

Prepared By

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August 7, 1978

## WHAT IS COGNITION?

Cognition is a general term covering all the various modes of knowing -- perceiving, remembering, imagining, conceiving, judging, and reasoning. Some psychologists discuss cognition as the ultimate mode or aspect of a concious life. Another word for cognition, one that is more familiar, is comprehension.

Cognition is fundamental to all learning. Almost all educational tasks are cognitive because education seeks to develop comprehension.

Often, however, cognitive growth is minimized and, instead, teachers seek to have children memorize facts or recall details. Teaching that minimizes cognitive growth may help children pass tests, but such teaching does not help children in the long run after the facts are forgotten.

Cognition is a mental ability -- not easily seen! It is that mental ability that includes discovery of relationships, an awareness of something old or new from one's past or immediate experiences, and the understanding of things seen, heard, felt, or experienced by other senses.

## IF COGNITION IS NOT EASILY SEEN, HOW WOULD ONE KNOW THAT A CHILD IS DEVELOPING COGNITIVE ABILITIES?

Cognition is not easily seen -- it is a covert behavior! If a child remained silent all the time, there is little doubt that his cognitive growth would be hidden from the teacher. To study a child's cognitive growth, one must probe into the mechanisms through which covert mental processes become observable. Simply, the covert must become overt.

The most educationally relevant mechanism through which children reveal their cognitive abilities is speech. How children talk about their experiences, how they show that they have organized information, how they interweave facts and details into understandable statements, how they reveal the judgments they have made, and how they solve problems put to them -- these are events that occur through the mechanism of speech that make cognitive abilities overt and readily observable.

Of course, cognitive abilities can also be studied by those educationally relevant tasks that substitute for speech, mainly writing. In the early elementary grades, writing is a less reliable way to study cognitive development, mainly because the mechanics of writing have not yet been mastered. Speech is the method by which cognitive abilities are studied.

## WHAT IS COGNITIVE THERAPY?

Earlier, cognition was defined simply as **comprehension**. The term **therapy** means **to change a behavior**. The term **cognitive therapy** means to change **comprehension behavior.**

## COMPREHENSION IS A COMPLEX BEHAVIOR. CAN IT BE MADE LESS COMPLEX?

Comprehension can be made less complex, especially when it is remembered that all complex behaviors come from simple beginnings. When one thinks back to the development of children's mental growth, it becomes fairly obvious that cognitive abilities emerge from very simple beginnings.

One thing is for certain -- cognitive growth parallels the child's development of language. As the child gains experiences and the words and organizing patterns to talk about those experiences, then there is evidence of his cognitive growth. Words are imperatives of cognitive growth.

## WHAT ARE THESE SIMPLE BEGINNINGS OF COGNITIVE GROWTH?

Let us start with the infant. It may well be that the infant has some crude sense of cognition shortly after birth. His first cognitive abilities, however crude, are highly useful. Certainly, infants make some sort of distinction between light and dark because infants show a preference for light by outcries in the dark. Light reveals the presence of a world of stimuli whereas darkness closes off his unknown and yet unorganized environment from him.

His outcry of "mama" may be his first overt act to indicate his cognitive growth through speech. The word **mama** may also be the infant's first abstraction, referring to the satisfactions given to him by a caring adult rather than the word he uses for his true mother.

As the infant halts before a parent's treasure and mutters "no no" one may infer that the infant has cognized certain things that are forbidden from those that are not forbidden. Indeed, the infant seems to understand a world divided between what one can do and what one cannot do. Perhaps this division is the first form of discipline yielding obedience in later years.

Throughout infancy and early childhood, cognitive abilities accelerate because of language, as language is understood and expressed. He clearly understands, "Eat your dinner!" and "Look out for the cars!" He is, however, easily confused. He learns that animals with four legs have different names and expresses his understanding of animals by using simple words such as doggie, kitty, moo-cow, etc. He isn't quite certain that all rabbits aren't Easter Bunnies, and, of course, he is willing to give life to a stuffed animal. This young child keeps his mind organized for simple things, but he is baffled by abstractions. It is terribly difficult for him to understand how there can be several Santas all in town at the same time -- these abstract problems must be resolved at a later time.

The young child's cognitive abilities are largely informal, meaning that his mental growth is not governed by rules or reasoning. For example, he may well believe that eating Wheaties will make him strong, that spinach builds big muscles, that Keds will make him run fast, and that candy causes tooth decay. He will still prefer candy to spinach, largely because his mental growth is guided by affective criteria, i.e., his emotional disposition toward things. He does have some cognitive abilities that are formal, meaning that he has ideas about things that are shared by mature persons. He knows, for example, that if he goes in the rain he will get wet, that ice is cold, that some things are hard while others are soft, and that some things are up while others are down.

It isn't possible to list all of the informal or formal cognitive abilities possessed by children. It is possible, though, to trace development of cognitive abilities by stages.

## WHAT ARE THE STAGES OF COGNITIVE GROWTH?

There are three stages of cognitive growth. These stages are called **concretistic, functional,** and **conceptual.** The concretistic stage is the first stage to develop in children, generally characteristic of children below the age of five. The next to develop is the functional stage, occurring about age five and reaching its peak among children of age 8 or 9. The final stage, conceptual, begins around age 8 or 9, is readily evident in children of pre-teen age (11 or 12), and continues throughout life.

## WHAT ARE THE CHARACTERISTICS OF EACH OF THESE STAGES?

### Concretistic Stage

Children at this stage of cognitive growth can be characterized as "here and now" or perceptually dominated in their development. Their cognitive style, or the manner in which they handle new information, is largely on purely practical grounds. For example, money is to buy candy, toys are for play, etc. When asked to tell how a dog and a cat are alike, concretistic children are likely to say,

"Because they have tails...you can pet them,,they have eyes..." The concretistic child uses logical perceptual practical grounds for organizing and expressing experiences.

**Functional Stage**

Children at this stage of cognitive growth can be characterized by their propensity to tell the common use of things in their world -- how things work, what things do, and what things can be used for. When asked how coffee, tea, and Coke are alike, the functional child will respond, "Because you can drink them!"

**Conceptual Stage**

Children at this stage of cognitive growth can be characterized by their abilities to organize old and new experiences into formal categories. When asked how a train and bicycle are alike, the conceptual -child respond, "Because both are vehicles for transportation."

The major distinctions between these three stages of cognitive development are the words and the ideas represented by the words the child has available to him. As mentioned earlier, cognitive growth and language development run a common course -- as one grows so does the other.

## HOW CAN A TEACHER FACILITATE COGNITIVE GROWTH?

A teacher can facilitate cognitive growth by careful attention to the child's development of language. Of and by itself, however, language will not be sufficient. In addition to language, the teacher will have to provide experiences so the child will have new information and, often, the teacher will have to reshape old experiences so that these will become more formalized.

## WHAT ARE THE COGNITIVE PROBLEMS OF DISADVANTAGED CHILDREN?

Disadvantaged children can be characterized as having cognitive problems. These problems need not be permanent, especially if the teacher will plan learning activities to remove the problems. Apparently, the problems are these:

1. Typically, children from a background of poverty are crippled in language development because they do not perceive of the notion that objects have names, and that the same object may have different names.
2. Typically, children from disadvantanged homes do not have the familiar environment in which questions are asked or answers are expected. Asking and answering questions is a fundamental postulate on which the school culture is organized and such children fail to bring to school a readiness to get and share information.
3. Typically, the home environment of the disadvantaged child is one where there is a paucity of objects. As a result, the child's curiosity is affected because there isn't much to be curious about, there are few things to ask questions about -- and worse, there isn't an adult model to stimulate the child's curiosity or to satisfy whatever curiosity that may occur.
4. Disadvantaged children often present weak ego-involvement, that is, they have generalized poor feelings about themselves. In some instances this is due to not having the language of emotions -- to solving problems through physical force rather than insight and compromise.
5. Typically, the language patterns of the disadvantaged environment are simple -- almost at concretistic levels, functional levels at best -- because the circumstance of the disadvantaged is so ever-present that perceptual requirements dominate the environment. It is a "here and now" world, to "do and have done" world -- and world without the abstractions commonplace in the world of advantage.

As a consequence, disadvantaged children are often indifferent to language. Indifference to

language when language is pivotal to cognitive growth, is indifference to comprehension. This indifference functions counter-productive to school achievement.

## WHAT ARE THE KEY INGREDIENTS OF A COGNITIVE THERAPY PROGRAM?

The key ingredients of a cognitive therapy program, one designed for disadvantaged children, are a) the facilitation of specific language abilities, and b) the facilitation of comprehension.

## WHAT ARE THE TECHNIQUES FOR THE TEACHER TO USE IN A COGNITIVE THERAPY CURRICULUM?

The teacher will use only two techniques in a cognitive therapy curriculum. These are:

1. **Controlled questions** directed to the child for the purpose of stimulating the child's cognitive processes; and,
2. **Analysis of the child's response[s]** to the questions for the purpose of assessing the status of the child's cognitive abilities.

These techniques are easily mastered and can become second-nature in the teacher's routine.

## WHAT ARE THE GOALS OF A COGNITIVE THERAPY CURRICULUM?

There are three goals in a cognitive therapy curriculum. These are:

1. Vocabulary development -- to increase the stock of words and meanings available to a child.
2. Verbal reasoning -- to increase the child's ability to draw relationships and form associations of old and new information.
3. Verbal fluency -- to increase the child's ability to talk, using newly acquired words, meanings, and relationships.

## WHAT ARE THE EXPECTED OUTCOMES OF A COGNITIVE THERAPY CURRICULUM?

On the basis of what has been presented so far, the expected outcomes of a cognitive therapy curriculum are several. The major outcome is, of course, facilitation of comprehension to such an extent to provide an improved basis for school achievement. A secondary outcome, one correlated to the major outcome, is improvement on children's overall cognitive abilities to such an extent to materially influence their performance on measures of cognitive abilities, i.e., intelligence tests.

## WHAT ARE SOME POSSIBLE UNEXPECTED OUTCOMES OF THIS CURRICULUM?

It stands to reason that children who achieve in school, and who grow brighter because of successful school experiences, are children who will likely show significant changes in their ego-development. One unexpected outcome of this curriculum is the probable development of a pattern of school success of such magnitude to set-aside concerns of a learner having feelings of inadequacy in formal school experiences. Further, it can be hoped that children experiencing a cognitive therapy curriculum will look on school as a place that is comfortable, exciting, and enriching.

SELF-QUIZ (Answer True or False)

____1. Cognitive abilities depend on language.

____2. Cognitive abilities cannot be observed, but cognitive abilities can be studied by the language a child uses to talk about things.

____3. The teacher uses two techniques in a cognitive therapy curriculum: a) controlled questions, and b) analysis of the child's responses.

____4. Vocabulary development is one goal of a cognitive therapy curriculum.

____5. Disadvantaged children use language effectively, especially to describe things they come in contact with.

____6. There are three stages of cognitive development.

____7. Language facilitates cognitive development.

____8. Formal cognitive abilities depend on rules and reasoning.

____9. School achievement is largely dependent on cognitive abilities.

____10. Cognitive therapy means that IQ tests are given to a child.

All Correct.....excellent
8-9 Correct.....good
7 Correct.....fair
0-6 Correct.....poor

Key: 1. T; 2. T; 3. T; 4. T; 5. F; 6. T; 7. T; 8. T; 9. T; 10. F.

## APPENDIX D

## SOI TRAINING MATERIALS

These materials available from:

SOI Institute
214 Main Street
El Segundo, Ca. 90245

## REFERENCE AND IN-SERVICE TRAINING MATERIALS

Beginner's Reader about the SOI Model ..... $1.00

SOI: Its Interpretation and Uses ..... 13.50

SOI Questioning Techniques for Teachers ..... 1.00
SOI Coloring Book for Teacher Training ..... 4.00
SOI Coloring Book Manual for Teacher Trainers ..... 2.50

## PUPIL INSTRUCTION

General Ability Workbook: Cognition
Basic (k-8) ..... 8.00

Exercises Sheets (8½ X 11)
Basic Cognition ..... 3.00

## APPENDIX E

## THREE STEPS FOR TEACHING EXPRESSIVE VOCABULARY

## THREE STEPS FOR TEACHING EXPRESSIVE VOCABULARY

1. Classes of words (nouns, verbs, and descriptive words) are taught in isolation and embedded in a sentence.

   "**Magician**. A magician is a man
   who makes magic."

   By isolating the word, it is stressed repeatedly so that children's attention is focused on it.

   By embedding the word in a sentence, the children learn how the word relates to other words in language.

2. Provide an adequate number of teaching situations in which new words are demonstrated, explained, or presented visually.

3. At a later time, ask questions to discover if the children have retained the words taught and their meanings.

   Use standard probe questions to elicit words and their meanings :

   What is a _____?

   "Tell me about _____ !

   "What else can you tell me?

## PREPARING TO TEACH EXPRESSIVE VOCABULARY

A. Select words from word lists (noun, verb, and descriptive word lists)

B. Begin teaching with those words that can be found in pictures.

C. Use real objects and/or actions whenever possible.

### Use Demonstration for Verbs

For verbs particularly, accompany all teaching with demonstration. Allow the children to engage in the action expressed by the verb.

> "Guitar. You can strum a guitar and make music." (Teacher demonstrates strumming on the guitar.) "See, you can strum a guitar! You do it, too! Pretend you are strumming a guitar to make music."

### Relate Descriptive Words to other Words

Teach adjectives and adverbs in relationship to other words.

> "Backward. Here the boy is walking backward. Here the car is parked backward. Look, I can write backward! (Teacher demonstrates backward writing.) You try it, too! Try to write backward."

### Keeping Track of Children's Progress

Maintain a record of each child's progress in vocabulary mastery. Use a form like the one to follow:

Pupil's Name_____

| Word List | Can give word | Can relate meaning |
|---|---|---|
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## NOUNS

accident
adult
afternoon
age
air
allowance
alphabet
ambulance
ankle
apartment
apartment building
arithmetic
art
arrow
attic
aunt
automobile
autumn
band
bank
bars
baseball
basement
beard
behavior
bench
blood
birthday
body
brain
brick
bride
bridge
building
bunch
cabinet
calendar
camp
cane
card
cashier
cash register
cavity
cemetary
chain
check
chest
church
circus
city
class
cleaners
collar
collection
column
campany
conversation
corner
country
crash
crowd
custodian
danger
daughter
dentist
department store
dime
dollar
dream
drug store
edge
elbow
elevator
entrance
escalator
evening
excuse
exercise
eyebrow
eyelash
fall
fault
field
fire drill
flashlight
footprint
forest
forehead
fruit
furniture
garbage collector
garden
gas
gas pump
gas station
ghost
grade
grandfather
grandmother
grave
groceries
guest
guitar
gym
half
handle
handwriting
health
heart
heel
highway
holiday
hospital
hotel
hour
husband
ice
jail
joke
kind
knob
knot
lake
laundramat
lesson
letter
library
lightning
lungs
magazine
magic
magician
map
marble
mat
meal
meat
minute
mistake
month
morning
motor
motorcycle
moustache
movie
neighbor
neighborhood
next
nickel
mothing
number
ocean
office
package
pain
pair
parent
parking meter
part
penny
pest
pet
pill
poison
post office
price
principal
prize
problem
program
quarter
ranch
reason
recess
rectangle
relative
religion
responsibility
rhyme
riddle
roof
row
scale
sea
season
secret
secretary
seed
sentence
shadow
shape
sheet
show
sign
siren
size
skin
slice
snack
somersault
soldier
son
spring
square
stamp
stomach
storm
street cleaner
stripe
student
submarine
suitcase
summer
tent
Thanksgiving
time
tip
tool
town
tracks
traffic
transportation
triangle
trick
trip
trouble
truth
uniform
uncle
vacation
valentine
vegetable
visitor
waist
waiter
waitress
war
weather
week
whistle
wife
voice
yard

## VERBS

add
balance
believe
bleed
born
borrow
bowl
breathe
bury
choose
connect
cost
die
drip
examine
face
fish
gallop
giggle
guess
hand
harm
interest
juggle
kill
lean
lend
learn
lick
marry
mean
measure
melt
owe
own
pack
plant
pray
print
promise
protect
quit
recognize
return
rush
save
seem
serve
shiver
slap
spell
spend
spoil
spread
sprinkle
steal
stretch
study
sweat
tap
teach
think
trade
understand
water
weigh
worry
wrap

## DESCRIPTIVES

absent
alive
ashamed
backward
beautiful
brave
bright
bumpy
busy
careful
clear
cloudy
cool
comfortable
crazy
crooked
curly
dangerous
dead
deep
delicious
early
eight
eighteen
eleven
enough
excited
fair
favorite
fifteen
fine
five
flat
forward
four
fourteen
free
frightened
frozen
glad
great
handsome
heavy
helpful
here
important
interesting
kind
large
late
lazy
left
light
loose
mean
narrow
nine
nineteen
none
plenty
polite
poor
right
rough
safe
salty
second
selfish
seven
seventeen
shiny
shy
six
sixteen
smooth
soon
sour
straight
strong
sunny
sure
sweet
tame
ten
terrible
third
thirteen
tight
tiny
twelve
twenty
twisted
warm
weak
whole
wide
wild
windy
wonderful

## APPENDIX F

## THREE STEPS FOR TEACHING CONCEPTS

## THREE STEPS FOR TEACHING CONCEPTS

1. Classes of words (nouns, verbs, and descriptive words) are taught in related pairs.

   "Bicycle and wagon. Why do these belong together?"

   By teaching words in pairs, it is stressed repeatedly that words can be related to other words.

2. Provide an adequate number of teaching situations in which the teacher and children can talk about **why the words belong** (or go) **together**.

   Three levels of relationships of words to one another should be discussed.

   A. Descriptive relationships -- the teacher and children talk about things that are in-common to both words:

   "Yes! A bicycle and a wagon go together because they both have wheels!"

   B. Functional relationships -- the teacher and children talk about functions or uses in-common to both words.

   "Yes! A bicycle and a wagon go together because you can play with them!"

   C. Categorical relationships -- the teacher and children talk about a word that expresses a class membership.

   "Yes! A bicycle and a wagon are both toys! Can you name some other toys?"

3. At a later time, ask questions to discover if the children have retained the concepts taught.

**To elicit a description**

Where is it?
What is it like?
How are these alike?
How many are there?
Is it like anything else you know about?
What parts can you find?

**To elicit a function**

How does it work?
What is it used for?
How is it used?
What can you do with it?

**To elicit a category**

Who uses it?
When do you use it?
What does it mean the same as?
Why would you like one?
What do you think?

**Preparing to teach concepts**

A. Select pairs of related pictures or pairs of related objects.

B. When presenting these pairs, always begin by asking, "How are these alike?" or "Why do these belong together?"

**Use Demonstration for Verbs**

For verbs particularly, accompany all teaching with demonstration. Allow the children to engage in the action expressed by the verb.

> "Why do **hit** and **strike** go together? Yes! They go together because they both say you do this! (Demonstrate)"
>
> "Now you do it! Hit the table! Now strike the table!"

**Relate Descriptive Words to Other Words**

Teach adjectives and adverbs in relationship to other words.

> "**Sad and crying.** Why do they go together? Do you ever cry when you are sad?"

**Keeping Track of Children's Progress**

Maintain a record of each child's progress in concept mastery. Use a form like the one to follow.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Pupil's Name_____

| Word Pairs | Tells Description | Tells Function | Tells Category |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Motivate Children to Learn and Retain Concepts**

Use games and contests to make concept learning fun and rewarding. Award special titles, i.e., "Concept Hero of the Day" for achievement.

**Maintain a Concept Corner**

In a convenient location, post all picture-pairs used to teach concepts. Use printed words when pictures are unavailable. Present these materials attractively in a special place called "The Concept Corner."

## CONCEPTUAL CATEGORIES

tools
foods
furniture
publications
containers
clothing
toys
transportation
signs and symbols
emotions
appliances
candy
homes
animals
jewelry

For additional conceptual categories, please look at Peabody Language Development Kits (all levels) and note the organization of pictures.

# APPENDIX G

## SUPPORTING INSTRUCTIONAL MATERIALS

COMMERCIAL PRODUCTS USED IN COGNITIVE THERAPY

| COGNITIVE FACTOR | PRODUCT | SUPPLIER |
|---|---|---|
| CFU | Word Matching Flip Books | D.L.M. |
| CFU | Spin-A-Shape Math Game | Ideal |
| CFU | Sound Foundation Program | D.L.M. |
| CFU | Auditory Perception Training Auditory Memory | D.L.M. |
| CFU | Word Picture Dominos (sight words) | D.L.M. |
| CFU | Homonym Cards | D.L.M. |
| CFU | Workbook for Letters and Sounds | D.L.M. |
| CFR | Moving Up in Numbers | D.L.M. |
| CFR | Dog House (Make a Word) | Kenworthy |
| CFR | Twenty Products (multiplication) | D.L.M. |
| CFR | Eye-Hand Integration Exercises | D.L.M. |
| CFR | Noun Puzzles | D.L.M. |
| CFR | Numbers up Game | Lakeshore |
| CFS | Syllable Scoreboard | D.L.M. |
| CFS | Magic Silent E | D.L.M. |
| CFS | Word Trek - blends and digraphs | D.L.M. |
| CFS | Alphabetizing Skills | Schaffer |
| CFS | Numan Cannon Ball (prefix game) | Schaffer |
| CFS | Motocross (alphabetizing skill) | Schaffer |
| CFS | Barbell Press (alphabetizing skill) | Schaffer |
| CFS | Compound Word Game | D.L.M. |
| CFS | Sequential Picture Cards I, II, III | D.L.M. |
| CFS | Space Flight | Ideal |
| CFT | Spin-It Math | Mod. Educ. |
| CFT | Picture Sequence Cards | Mod. Educ. |
| CMU | SPAR | Ideal |
| CMU | Suffix Game Board | Schaffer |
| CMU | Phonic Fun Work Books I & II | Schaffer |
| CMU | Language Activity Task Cards | Lakeshore |
| CMU | I Hate-to-Read series I | Ed. Act. |
| CMU | Comprehension Task Cards | Inst. Fair |
| CMU | What-cha-ma-call It | Cadaco |
| CMU | Cheese-Chase Silent Letter Game | Bradley |
| CMU | Prove it: Plurals, Possession Game | Bradley |
| CMU | Flash Words | Bradley |

| COGNITIVE FACTOR | PRODUCT | SUPPLIER |
|---|---|---|
| CMU | Round the Town Syllable Game | Bradley |
| CMU | Numbers UP | Kenworthy |
| CMU | U-No: A Phonics Game | Kenworthy |
| CMR | Functions | Teach. Res. |
| CMR | Shopping Lists Game I & II | D.L.M. |
| CMR | Following Directions | Martin |
| CMR | Sight Word Search Task Cards | Lakeshore |
| CMR | Imaginative Prepositions | Dormac |
| CMR | Phonic Flash Cards | Ed-U-Cards |
| CMR | I Hate to Read Series I | Ed. Act. |
| CMR | Comprehension Task Cards | Inst. Fair. |
| CMR | What-cha-ma-callit | Cadaco |
| CMR | SPAR | Ideal |
| CMR | Show Time | Schaffer |
| CMS | Word Ending Activity Book | Lakeshore |
| CMS | Career Association Cards | D.L.M. |
| CMS | SPAR | Ideal |
| CMS | Purpose Parade | Schaffer |
| CMS | OSCAR | Schaffer |
| CMS | Sentence Sharpness | Teach. Res. |
| CMT | Make Change | Teach. Res. |
| CMT | Sentence Sharpness, Level 2 | Teach. Res. |
| CMT | Read for Meaning | Lakeshore |
| CMT | Reading Activity Cards | Lakeshore |
| CMT | More Reading | Lakeshore |
| CMT | Reading Comprehension Activity Cards | Lakeshore |
| CMT | Content Puzzles | Edu. Services |
| CMT | Language Activity Task Cards | Scott-Fore. |
| CMI | Got to be Me | D.L.M. |
| CMI | Picture Sequence Cards | Mod. Educ. |
| CMI | People Puzzles | D.L.M. |
| CMI | What's Wrong Here | Teach. Res. |
| CMI | Imagination Puzzles | D.L.M. |
| CMI | Alternative Cards | D.L.M. |
| CMI | Photo Sequence Cards | Mod. Educ. |
| CMI | Alike Because | Teach. Res. |
| CMI | What's Missing | Teach. Res. |

## APPENDIX H

## LESSON PLANNING FORM

LESSON PLANNING FORM

DATE _____

ACTIVITY (describe)

SOURCE

COGNITIVE FACTOR

## APPENDIX I

## SAMPLE OF PERIODIC PLANNING

## SAMPLE OF PERIODIC PLANNING

To select supplementary materials (commerical materials), take in order:

1. CMU ..... Cognition of Semantic Units
2. CMR ..... Cognition of Semantic Relations
3. CMT ..... Cognition of Semantic Transformations
4. CMI ..... Cognition of Semantic Implications

### COGNITION OF SEMANTIC UNITS [CMU]

| | |
|---|---|
| **Reading** | Review all consonant and vowel sounds and blends.<br>Review all sight words. |
| **Math** | Review number groupings, basic addition and substraction facts (less than 20); review concepts of greater than, less than, and equal; review telling time; review words such as dozen, pair, several, few, many, etc. |
| **Social Studies** | Review local geography; seasons; holidays, special events; family and family members; community helpers; occupations. |

### COGNITION OF SEMANTIC RELATIONS [CMR]

| | |
|---|---|
| **Reading** | Review sound blending: review rhyming words; review compound words; review plurals; review possessives. |
| **Math** | Review money; length; weight; height; temperature; skip counting by 2s, 5s, and 10s; ordinal numbers (first, second, etc., through tenth); identify all common gometric shapes by name; recognize fractions (whole, half, third, and quarter); review days of the week, months of year, etc. |

| | |
|---|---|
| **Social Studies** | Review concepts of clothing, food, shelter, transportation, health, pets, animals, and emotions. |

**COGNITION OF SEMANTIC IMPLICATIONS**

| | |
|---|---|
| **Reading** | Draw conclusions from a picture or story; create alternative solutions; predict outcomes to situations. |
| **Math** | Make decisions about quantities by offering judgments, i.e., "If you don't have enough money to buy something, what can you do?" Make decision, accept or reject, mathematical outcomes, i.e., "Is 51 and 49 87 or 100?" and provide "proof" of decision by showing answer and correcting error. |
| **Social Studies** | Discuss solutions to problems such as: Billy is only six, but Jimmy is 12. Jimmy is a "bully" and picks on Billy. What can be done to help Billy? What can be done to help Jimmy? |

**COGNITION OF SEMANTIC TRANSFORMATIONS**

| | |
|---|---|
| **Reading** | Review vocabulary; emphasize organization of definitions, i.e., functional and descriptive terms (a ball is round, you can throw it, you can play games with it)<br>Review sequencing of stories; emphasize organization of story and insist on sequence in retelling story.<br>Review the search for the main idea of a story. |
| **Math** | Use decimals (place values); change quantities by adding number in horizontal line, i.e., 58 is fifty eight, 158 is one hundred fifty eight, etc. |
| **Social Studies** | Discuss concepts of social importance such as truthfulness, fairness, sorrow, living, etc. |